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Electrical Expressage.

There is under way in Baltimore the construction of an elevated framework, the main features of which are two narrow rails, upon which shall run a vessel or cartridge capable of holding express or mail matter, newspapers, baggage or freight of any kind. Above these rails and equi-distant from them is to run a third rail or copper conducting cable, through which the electricity will pass and propel the vehicle. It is stated that the freight cartridge, filled with newspapers in Baltimore, would land them in New York in a little over an hour and a quarter. Thus papers going to press at 3 o'clock in the morning would be in New York shortly after 4 o'clock. The electric carriage will fly along at great velocity, and the invention provides for lubrication as the automatic express train speeds upon its way.

The gentlemen who are engaged in the enterprise are exceedingly reticent, giving names of neither inventor, patentees nor stockholders, and calling the concern by the name of Electrical Dispatch Company. It is certain, however, says the Baltimore *Sun*, that the drawings of the machinery have been made and that a caveat has been filed in the Patent Office. The inventor is a Baltimorean. An experimental road nine miles long will be built near Baltimore to demonstrate the feasibility of the scheme, and it is probable that the first intertown line will be run between Baltimore and Washington, should the stockholding interest desire that route. In this case Washington people could stand with a telephone in hand and purchase dry goods or any other commodities and have samples shown them with almost the same facility a shopper can badger a clerk to-day.

Removing Excrescences by Electricity.

A friend was telling me, says a correspondent, of his own and his wife's experience in having moles and wens removed by electricity. His wife had on her right shoulder a blemish in the form of a large mole, quite half an inch in diameter, which practically made it impossible for her to wear ball or evening dresses, which would reveal her otherwise shapely shoulders. She accidentally heard of the electric operations, and, obtaining the address of the surgeon who performs them, she went without her husband's knowledge to his office, and submitted to the operation. It required about a week to heal the wounds made by the needles with which the mole was perforated in every direction; then the mole, which had been burned to a dry, black crisp, fell off, leaving the shoulder perfectly white, and with only the slightest indication to show where the discoloration had been. A new skin formed over it, and there is hardly a noticeable blemish there now. Success inspired her to insist on her husband's undergoing the same operation on a more delicate part of his person—namely, his nose. He thus tells his story:

"I had on my nose at birth, so I was told, a wen, which grew with my years until I became a man, and for many years it greatly disfigured my countenance. It was about the size of a pea, and was on my left nostril. It changed color from time to time, and would grow to be a frightful sanguinary red whenever I indulged myself with wines and liquors of any sort. I came to regard it at times as a gin blossom, and an irreverent reporter in describing me once suggested that this object had evidently been one of long and patient and costly culture. I went, on my wife's urgent entreaty, to her surgeon and asked him if it could be removed. He looked at it and suggested that it might be if I would not look upon the wine when it was red; but I told him I was born so. He examined further, and at once proceeded to operate upon it.

"He bathed my nose, first of all, in cocaine. It grew cold at first, then became perfectly numb, as though asleep from lack of circulation of the blood. It felt as if paralyzed. He then applied an electric needle to the wen, sticking it through and through, as near the roots as possible. There was no pain, though half an hour was consumed in the operation. Whenever he increased the current of electricity I saw billions of stars, and sparks seemed to flash from my eyes, and the eyeballs seemed to crack with each spark that apparently flew from them. When the operation was completed the wen was black, no longer red, and more unsightly than ever. He put flesh-colored court plaster over it and kept it there for about a week. Then in washing it off the mess of blackened flesh fell away. A new skin formed, and you can barely see a small scar where the unsightly object once was."

Mr. Butler's Gas Bill.

Mr. Butler left his room at 5 o'clock in the morning a few weeks ago to catch the upsound steamer for Portland, Oregon, and in his haste forgot to turn off his gas, which was burning brightly. Some of his friends saw the light in his room the next evening, and, thinking burglars might be going through Mr. Butler's drawers, went up, only to find the room locked and bolted, just as it had been left. The fact that he had forgotten to turn off the gas in his haste to catch the steamer dawned upon them all at once, and they determined to let it burn until he came back, even if he remained away for two months. About the time he got ready to sail from Portland to San Francisco, Mr. McDougald, one of his friends, telegraphed him: "Your gas is still burning."

"Why the devil don't you turn it out?" was the reply received from Mr. Butler.

When the news flashed over the wires that the Portland steamer had reached San Francisco, Fred Allen sent his absent friend the following message: "Dear Butler: Your gas is still burning, just as you left it. Penfield says he charges double rates when consumers keep their lights burning night and day."

This message was marked "collect," and the messenger who handed it to Mr. Butler remarked: "Dollar and a quarter, please."

Mr. Butler paid the bill and then opened the message, only to find that those horrid friends of his in Seattle were still carrying out that practical joke.

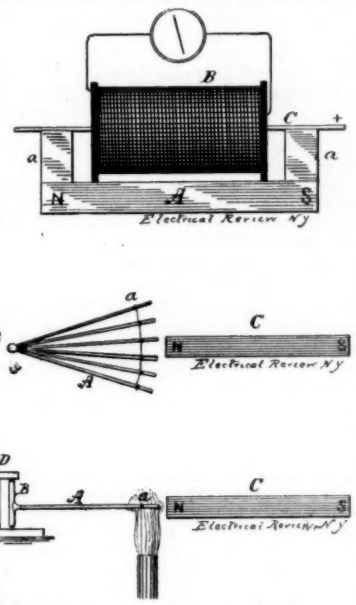
In his despair he rushed to the telegraph office and sent the following message: "Ed. L. Terry: Turn out my gas."

The next day he received from his friend Terry the following message: "Have lost my pass key and can't get in. The gas is still burning."

This was too much for the old gentleman, and his first idea was to come home at once and turn it off himself, but just as he was getting ready to leave Mr. Yesler reached the city. When the two met Mr. Yesler said: "Why, hello, Butler, what are you all packed for?"

"I'm going home to turn off my gas," said Mr. Butler. "At the rate it's burning, the gas company will own half my property if I stay much longer."

Mr. Yesler persuaded him that gas was very cheap in Seattle, and that the more a customer consumes the cheaper the rate is in proportion, and that if he should consume 100,000 feet during the month he was absent, the rate, when he got home, would be $2.25 per 1,000, instead of $3.50 per 1,000—the rate charged small consumers. This arrangement, while it was consoling to a certain extent, did not dissuade Mr. Butler from his desire to get home.



FIGS. 1, 2 & 3.—SEE "ANOTHER PYROMAGNETIC GENERATOR."

"Let her burn," said Mr. Yesler, "and go to southern California with Maddocks and myself, and when we get home I'll get Penfield to cut the bill down as much as possible, and I'll stand one-half the expense."

Mr. Butler considered that a generous offer, and, as he was very anxious to visit Los Angeles and other booming towns south of San Francisco, concluded to "let her burn."

Messrs. Butler and Yesler arrived home one night. The gas was still burning when Mr. Butler reached his room. He turned it out, and drawing a candle from his pocket, lighted it, and exclaimed: "Revenge is sweet! If Penfield takes advantage of my absence to get a lien on my property, now, henceforth and forever, I will eschew gas and illuminate my premises instead with tallow dips!"

—— The United States Electric Illuminating Company, New York, has declared a dividend of 2½ per cent., payable in January.

Another Pyromagnetic Generator and an Experimental Motor.

To the Editor of Electrical Review:

In your issue of September 24th you published a communication of mine, in which I referred to an article in *Phil. Mag.*, Vol. 40, p. 170, 1870, by Prof. Gore, entitled "Molecular Movements and Magnetic Changes in Iron, etc., at Different Temperatures," in which he describes experiments with rods of iron and nickel, having coils placed at each end, one coil being connected with a galvanometer and the other with a battery; the rods being heated in the middle, currents of electricity were generated when the temperature of the rods fluctuated above and below the critical range in which the magnetic change occurs.

A more careful investigation discloses the fact that he brought before the Royal Society, in the year 1868, an experiment which was published in the *Pro. Roy. Soc.*, Vol. 17, pp. 261-265, 1868-9, and in *Phil. Mag.*, Vol. 38, pp. 60-64, 1869, under the title "On the Development of Electric Currents by Magnetism and Heat." The apparatus used resembles the form of generator devised by Mr. Edison, in that it consists of an armature connecting the poles of a magnet and surrounded by a coil in which induced currents are generated by heating and cooling the armature. This is shown in Fig. 1. *A* is a bar magnet, having iron pole-pieces *a a*. *B* is a coil of fine wire connected with a galvanometer. *C* is an iron wire electrically insulated from the pole-pieces, and passing through the axis of the coil, being heated by the passage of a current of electricity.

It is but just to Mr. Edison to state that an extended research in the well-stocked library of the Franklin Institute was required to disclose the publications to which I have referred.

A description of an experimental motor which I devised in the early part of the year 1884 may be interesting to your readers, as it is easily made and will move rapidly. It consists of a number of small radial iron wires *A*, Fig. 2, having a small copper wire *a* plaited around them to keep them in position, and secured by solder or otherwise to a vertical axis *B*, their ends being trimmed to an arc of somewhat less radius than their length. A side view is shown in Fig. 3, *D* being a frame in which the axis moves. If the fan of wires be placed before a bar magnet *C*, it will adjust itself in the horizontal plane in which it moves so that the central wires are opposite to the pole of the magnet, and if the flame of an alcohol lamp or Bunsen burner is placed under the central wires they will become heated and the fan will acquire a rapid reciprocating motion, resulting from the alternate heating and chilling of the wires above and below the temperature at which the critical change occurs, the ends of all the wires being at a red heat.

To secure regular motion the flame should be completely shielded from air currents.

A mixture of borax, glass and lime fused upon the wires will considerably reduce the oxidation.

WM. B. COOPER,

No. 517 Locust street, Philadelphia, Pa.

Nov. 28, 1887.

Revision of the Patent Law.

By Arthur Steuart, of Baltimore, General Counsel of the National Electric Light Association.

Before proceeding to discuss the details of the law that require changes and additions, I cannot refrain from making a few remarks upon the patent system in general and its influence upon the industrial development of our country.

Who can measure the benefits that this land has derived from the inventions that have been produced by its citizens? The roll of honor is too long to be repeated. The cotton gin, the printing press, the reaper, the application of steam to all the uses of civilization, and, latest, but not least, the modern application of electricity in its multitudinous forms; but, while these brilliant achievements occupy our attention, we must not overlook the thousands upon thousands of inventions relating to matters of detail in every industry that have cheapened the product by saving time, material, power or labor. The fact is apparent that our advancement as a manufacturing nation has been due to the introduction of new methods of work, which have enabled us to produce staples at such a price as to compete with other nations in the markets of the world or in the development of new devices which have supplanted old ones or created a market for themselves. This being true, we must look for a cause for this development. What has induced the people of this country to create so many new things, to labor so long and arduously to lessen the cost of production of some article, or to supply a new one to take its place which is better or cheaper?

I think we may state it as a proposition that will not meet with denial, that the prevailing motive of the American people is a motive of pecuniary gain—a desire to amass wealth, to attain power by means of money—and whatever avenue offers them this reward will be the one into which they will press with a vigor and determination that knows no such thing as failure.

When the framers of our Constitution inserted into it the clause which provides that "Congress shall have power to promote the progress of science and the useful arts by securing * * * for limited times to * * * inventors the exclusive right to their * * * discoveries," they laid a foundation stone upon which an edifice has been constructed that has far surpassed anything they had conceived. Upon this provision of the Constitution is our patent law based, from it it takes its spirit, and with the view of adhering more closely to this spirit have the amendments to the patent law been suggested, to which I shall ask your attention this evening.

The patent laws of the United States, passed in pursuance of this provision of the Constitution, open up before every citizen of this country, as well as before those of many others, opportunities of obtaining wealth and power that are not presented by any other set of circumstances under the sun. In a single moment of time, by a quick operation of the mind, the poor mechanic may be put into possession of an idea that, by its own development, may place him among the princes of the land.

This is the possibility that presents itself to every man, rich or poor, high or low, who comes to understand the meaning of our patent system and its results.

What force can be compared with this to produce in the minds of men thought, deep, concentrated and continuous, for the production of inventions, a thirst for knowledge and a frugality of life that will supply a surplus of funds for the acquisition of knowledge and the development of inventions, and an ambition for their children that they shall have greater advantages of education upon which to work than their parents? And who can estimate the value to a State of such influence upon its citizens? This training, foreign manufacturers testify, produces in American operatives a power of comprehending their work, and a rapidity and dexterity of workmanship, that makes it impossible for them, with labor at one-half the cost and their factories fitted with the latest American machines, to produce the same goods as cheaply as they can be produced in this country.

It therefore goes without saying that with such an inestimable good to the nation, both in improving its industries and its people, to be attained by stimulating inventors to their highest effort, the only true course for the lawmakers to pursue in framing legislation relative to this subject, is to endeavor to make the process of obtaining a patent upon an invention as quick, easy and inexpensive as possible, and after it is granted to throw around it, in the hands of its owner, every form of protection known to the law, that will enable him to realize the full intent of the Constitution, and enjoy the exclusive right to make, use and vend the invention.

Our patent system, as it exists to day, is a grand structure, but it has some defects which are due principally to the fact that the demands made upon it by the development of our industries have far exceeded anything that the framers of the present law contemplated.

The patent law of to-day is substantially identical with the law passed by Congress in 1836. This law was revised in 1870, and codified in 1874, but few changes were made in it, and little, if any, protection was made, to accommodate the immense mass of business that has been cast upon the Patent Office, and some of the new features that were introduced have been found to work a hardship upon inventors rather than a benefit. So that practically we are working under a law formulated fifty years ago, when the work of the Patent Office for the whole year was something less than it is to day for each week. Is it surprising, therefore, that the child should have outgrown his clothes? And this is practically just what has taken place. A Commissioner and a half dozen examiners were quite equal to the task of examining intelligently four hundred and fifty patents a year, but the case is a very different one when the Commissioner has under him something like two hundred examiners, and when the annual issue of the office is something over 25,000 patents.

If time permitted I could show you how utterly impossible it is for the work of the Patent Office to be accomplished with any degree of satisfaction to the public under the prevailing organization, but I know that most of you are quite as well aware as I am of the defects that exist, and are quite as much interested in removing them. I shall pass at once to the consideration of the measures of reform that seem desirable in the Patent Office.

I.—THE PATENT OFFICE SHOULD HAVE THE EXCLUSIVE USE OF ITS BUILDING.

All those who have had any experience with the internal operations of the patent office are aware of the fact that this office is greatly cramped for space. The examiners are often crowded into rooms that are so small that there is scarcely space enough between the desks to move about. Many of the officers and employes are compelled to work in quarters that are unfit for human habitation, simply because there is no other place to put them; and the documents and records of the office are so crowded, and the places in which they are kept are so unfit for their accommodation, that they are in constant danger of destruction. The patent office building was constructed with money every dollar of which was paid to the Government by patentees and applicants for patents, and yet the patent office is crowded into less than half of this building. The Interior Department, with its Land Office and Indian Department, occupy the balance.

The Interior Department should have separate quarters, and the Patent Office should have the whole of its building, which will not more than accommodate it.

II.—THE PATENT OFFICE SHOULD HAVE THE WHOLE OF ITS OWN INCOME.

For the past fifty years the Patent Office has paid all of its own expenses, has built its own building, and in addition to this, has paid the Government an annual revenue, which aggregates to-day, without interest, something over three millions of dollars. And yet the most difficult task that the Commissioners of Patents have had to perform has been to induce Congress to authorize the expenditure of a part of this revenue for the necessary expenses of the Patent Office. For the proper dispatch of the work of the Patent Office, considerable additional force is necessary. The Commissioner of Patents should be authorized to expend the whole of the income of the office for its own expenses, and what was not spent should be set aside as a fund to be used for the benefit of the office at any time that it is needed.

III.—EXAMINERS.

The Staff of Examiners in the Patent Office have charge of public interests of a most vital nature. They are the virtual judges of whether an inventor shall have a patent for his invention at all, and also what kind of a patent he shall have in case they give him any.

It is therefore apparent that in order that they may perform their duties with intelligence and efficiency, they must fulfill several conditions:

1st. They must be thoroughly educated in the technology of the arts and sciences, and in the patent law. Experience has shown that this training can only be acquired in one of two ways, either by systematic teaching or by years of experience in the practical work of the Patent Office. The latter method is the one now in operation, and it results in creating a class of examiners who are undergoing the process of education at the expense of the unfortunate inventor whose case may fall into their hands. The inventors of the country have a right to demand that this system of education of examiners at their expense be discontinued, and a system adopted that will secure to the Patent Office a corps of examiners who will be thoroughly trained before they enter the office, and to the inventor the examination of his case by a ma fully equipped to make such examination in the best manner.

2d. Having obtained a staff of competent and thoroughly equipped examiners, they must be retained in office, so that the public may have the benefit of their services through a number of years. The army and navy have long since solved this problem by the exercise of a system of education, compensation, promotion and retirement on pay which fully secures these ends. Why should not that system so successful in one branch of the government service, be established to secure similar and equally necessary results in the Patent Office?

3d. The examiners should be relieved from all political influence. Civil service reform has attacked the question of political interference with Patent Office appointments with little success. The evils from this cause now existing are great and call loudly for remedy. The army and navy system has put those departments of the public service almost entirely beyond the reach of the politicians. Thus it should be with the Patent Office.

IV.—SALARY OF COMMISSIONER OF PATENTS.

The salary of the Commissioner of Patents should be very high, so that every examiner may feel that, if he is faithful and does his duty, he may some day, in the natural order of promotion, reach a place of honor and large emoluments. This is the system of the army and navy, and in those departments it works admirably.

V.—A PATENT COURT SHOULD BE ESTABLISHED.

The greatest evil that exists to-day in the administration of the patent system, lies in the lack of harmony between the Patent Office and the courts of the United States in which infringement cases are determined. Every practitioner before the Patent Office knows how little regard is paid by the examiner to the decisions of the courts upon questions of patent law, and it has long since become a thing of the past when the courts give any weight to the presumption of patentability that would naturally arise from the fact of the Commissioner of Patents having granted a patent upon a device. For the accomplishment of the best results with our patent system, the interpretations and application of the law under which patents are granted should be the same as that under which rights growing out of patents are determined. So that a right granted by the Patent Office would be sustained by the court, and the rulings of the courts would be in conformity with the spirit of the Constitution which has originated the whole system.

Under the existing system the examiners in the Patent Office interpret the patent law for themselves, and it has been my experience that few of them agree upon many points. The practical questions which have to be passed upon by the examiners seldom if ever get before the Circuit Courts, but are decided by the Commissioners of Patents, who, it is well known, seldom possess any knowledge of patent law when they enter upon the duties of the office, and seldom occupy the position long enough to be of any practical service to the office after they have learned something of the law by experience. The result is that a majority of the cases passed upon by the Commissioners, and which are intended for the guidance of the examiners, are decided at a time when the particular Commissioner is almost entirely ignorant of both the law and the practice of the office. It is, therefore, only to be expected that the examiners should form their own notions of the law, and pay little regard to either Courts or Commissioner, and as the examiners are not lawyers and have no knowledge of the patent law, except such as they may gain from the conflicting decisions of the ever changing Commissioners, and as they have had no judicial training, it follows as a matter of course that each primary examiner has his own interpretation of the law and his own peculiar notions of how it should be applied to the practical questions that arise in his daily work. The result is that we have as many different patent offices as we have divisions, and scarcely any two of them with the same views of the law, but each having the power, and exercising it, of issuing patents according to his own individual notion of what the patent should contain and how it should be framed, and these patents thus issued are the title papers upon which the inventors of the country are compelled to base their claim when they come into the courts for the purpose of protecting their property. Is there any wonder that it is difficult to obtain a patent of any value or to sustain and protect it after it is procured? It seems, therefore, to be eminently desirable that the same tribunal (which shall be so framed as to insure its capacity) should have appellate jurisdiction from both the Patent Office and the Circuit Courts, so that by vesting both jurisdictions in one competent court, the rulings of both branches, the Patent Office and the Circuit Courts, may be made uniform, and the anomaly removed that now exists of one branch of the government employed in granting patents and another in destroying them. It may be said that such a court exists at this time, but we all know how far removed the Supreme Court of the United States is from the Patent Office, and how little influence it has upon its practice, besides which the existing evils have grown up under the present system, which demonstrates its incapacity to remedy them.

A strong, well-selected court of expert patent lawyers would have many advantages. It would harmonize the Patent Office and the Circuit Courts. It would crystallize the practice of the Patent Office, so that it would be possible for attorneys to form some conception of what that practice was, and be able to advise their clients with safety with reference to their rights. The inventor could have some hope that when he had complied with his part of the government contract by disclosing his secret he would be protected in the exclusive right to use it. Such a court would lift a great burden from the shoulders of the Supreme Court, as but a small proportion of cases decided by it would be appealed to that court, and its rulings being binding upon the Circuit Courts, would enormously simplify the practice in those courts.

The jurisdiction of such a court should be altogether appellate, and should consist in appeals from the Board of Examiners-in-Chief upon questions of anticipation, patentability and practice, from the Examiners of Interference, upon questions of priority between applicants for patent upon the same invention, and of appeals from the Circuit Courts of the United States upon all questions relating to patents that now go to the Supreme Court. It would be proper also to include within the jurisdiction of this court all questions now passed upon by the Commissioners of Patents, such as trade-marks and labels; copyrights might also be included. With such a court the duties of the Commissioner of Patents should be purely executive, and the jurisdiction of the Supreme Court of the District of Columbia in matters of appeal from the Commissioner, should be cut off. The Supreme Court of the District should bear the same relation to this court as the Circuit Courts.

Passing from the question of the reorganization of the Patent Office to specific amendments to the law, the first question that presents itself is the question of limitation to actions.

VI.—LIMITATIONS.

It is pretty well settled by the courts that since the adoption of the Revised Statutes of 1874, there has been no limitation to the right of an owner of a patent to bring suit against an infringer for the recovery of damages for such infringement. Prior to that time, the only limitation that existed was six years after the expiration of the patent, and this seems to be the just rule. Many rules for limitation have been suggested, but it seems to me, in view of the fact which all of us have experienced, that the last few years of a patent are often the only ones during which the inventor realizes anything from his invention, that to cut him off from the recovery of damages from infringers, who may have pirated his invention during a period when he was too poor to stop them would be unjust in the extreme.

VII.—DAMAGES.

The existing equity rules for the recovery of profits and damages for the infringement of a patent are in very satisfactory shape, but since the decision of the Supreme Court in Root *vs.* The Railroad Company, these rules do not apply to actions brought for the recovery of damages after the expiration of the patent. Such actions must be brought at law, by an action of trespass on the case, and the measure of damages under that form of action is much less liberal than the rule in equity. In an action of trespass on the case the measure of damages is the actual loss to the plaintiff, and not the gain to the defendant; while in equity, the rule allows the recovery of either the loss to the plaintiff or the gain of the infringer, whichever may be the greater, and often the difference is very great. If it is just and right that the owner of a patent should have all the benefits that may or can be derived from the use of his invention, and this is the theory of the law, and is one form of action before the expiration of his patent, is allowed to recover these benefits; in the absence of a statute of limitations, why, in justice, should he be deprived of this benefit simply by the expiration of his patent? It would seem as if this evil should be remedied by legislation. It might be done by giving a plaintiff a standing in equity under a bill for an account and discovery, independent of an injunction, or if the patentee were permitted to bring an action of assumpsit for recovery of the benefit that the infringer had derived by the use of his invention, this might be almost as well; but this would require the interposition of a jury, and in complicated patent cases it is difficult to accomplish satisfactory results with a jury. It is almost impossible to make a jury understand mechanical technicalities, or for the attorneys to do justice to the case upon oral testimony.

We have at this time a case in point which illustrates this rule. For seven years the

owners of certain patents have been in constant litigation, seeking to sustain them. We have recently succeeded in getting a decree in their favor, and a month before this decree was rendered the patents expired. The patents have been extensively infringed and cover important inventions. We have now no remedy save to sue at law by an action of trespass on the case. As a matter of fact, the owners of the patents have never established a license fee for their use; but if they had, as they might have done, it would not probably have been more than $10 for each machine Hence, this sum, in our action at law, would have been the limit of our possible recovery, notwithstanding the fact that the infringer, by the use of each machine, has saved to himself not less than $500. Why should the rule of law, in a case like this, be different from that in a case where a man, without my knowledge or against my will, carries off my horse and uses him for his own benefit for a certain period, after which I recover him? In such a case I bring a suit, and the jury estimates the benefit that the wrongdoer derived from the use of my horse, and awards me this amount as damages for this wrongful act. Would it be right that this wrongdoer should have the power of escaping liability by answering, when the jury found that he had made $100 by the use of my horse, that I could not in the same time have made but $10 with it? Would not this be putting a premium upon the wrongful act?

The question is still an open one whether, in those States where the common law forms of action have been abolished, an action could be maintained at law for the infringement of a patent, the substantial result of which would be the same as the common law action of assumpsit, although the statute prescribes an action of trespass on the case as the proper action.

VIII.—REISSUES.

Since the decisions of the Supreme Court in Miller *vs.* The Bridgeport Brass Company and the line of cases that have confirmed this doctrine, it may be said that a reissue, in the sense in which that term was formerly employed, is no longer possible. The unfortunate inventor who has employed, in his ignorance, an incompetent solicitor to procure his patent, or who yields to the unnecessary limitations of the office, and whose patent issues to him covering half of his invention, or possibly contains a disclaimer disclaiming the other half, can be said to-day to have no remedy for his misfortune; and if two years have elapsed since he procured his patent, or some enterprising manufacturer examines his patent, and finding that he has not covered the second half of his invention, proceeds to make and sell that half, he is forever barred from going back and claiming it. Some change in the law should surely be made to enable an innocent and meritorious inventor to secure the full benefit of his invention, if this can be done without destroying vested property rights in individuals.

Under the present law, when a patent is surrendered in order to obtain a reissue, all accrued causes of action for past infringement upon the original patent go with it, and no action can be brought for an infringement committed prior to the date of the reissue. There does not appear to be any good reason for the existence of this rule.

At present an application for a reissue must be signed and sworn to by the inventor. This rule puts it into the power of a dishonest person to extract money from the owner of the patent by refusing to sign the reissue papers. The owner of a patent should have the power to deal with his property as he chooses, and as he is considered, when he purchased the patent, to have purchased all that could have been covered by the inventor's original application, if the patent does not do this, he should have the power to reissue his patent upon his own petition, and an oath that he is the sole owner, or if there be several, that they own the whole title.

IX.—REPEAL OF PATENTS.

The statutes of the United States contain no provision which will permit a patent, supposed to have been obtained by fraud or mistake, to be set aside, nor for any action by the United States against the owner of such a patent to prove the fraud and have the patent declared void. The statute should contain such a provision.

X.—EQUITY PROCEEDINGS FOR SLANDER TO PATENT.

Neither statute nor precedent in this country authorize an equity proceeding for an injunction to restrain the continuance of slander against a machine or a patent, by one who falsely charges that the machine or the patent is an infringement of another patent owned by him, and threatens suit for such infringement but neglects to bring such suit, and who thus continues to disturb the business of the party slandered, without attempting to execute his threats or to vindicate his claim. Such an injury cannot adequately be remedied by an action at law for damages. What is wanted is an injunction from a court of equity, to stop the tongue of the slanderer at once and forever.

XI.—LICENSES.

Licenses should be recorded and subject to the same rules as mortgages of land; the license first recorded should take precedence.

XII.—JOINT OWNERS.

The mutual rights of joint owners of a patent are in a very unsettled state in the present condition of the law, and it would, I think, be much safer to say that joint owners are entirely independent of one another—although there are some cases to the contrary—than to venture any statement with reference to what those mutual rights may be.

It would seem that no good reason could be advanced why joint owners of a patent should not bear the same relation to one another as joint owners of any other property. If two persons own a house jointly, but in definite proportions, and one of those persons rents the house and receives the rent for it, the other can, of course, receive his share of the rent either from the person or from the property. The absence of well-settled rules upon this subject makes it very desirable that they should be established by statute.

XIII.—U. S. PATENT LIMITED BY FOREIGN PATENT.

United States patent should not be limited to expire with the shortest lived foreign patent upon the same invention, for the simple reason that the American inventor who gives his invention as a free gift to the foreigner, gets a patent here for 17 years, while he who seeks to protect himself abroad may limit his United States patent by several years.

XIV.—ASSIGNMENTS.

Assignments of patents should stand upon the same footing as conveyances of land; the assignment first recorded should take precedence.

XV.—EXPENSE OF LITIGATION.

Expense of the trial of patent cases might be lessened if the court was authorized, in impaneling a jury, as provided by the act of 1875, to impanel a jury of five expert persons in the subject matter of the case, pay them a suitable per diem, let them hear the testimony, and advise the court. Cochrane *vs.* Deener, 4 Otto, 784.

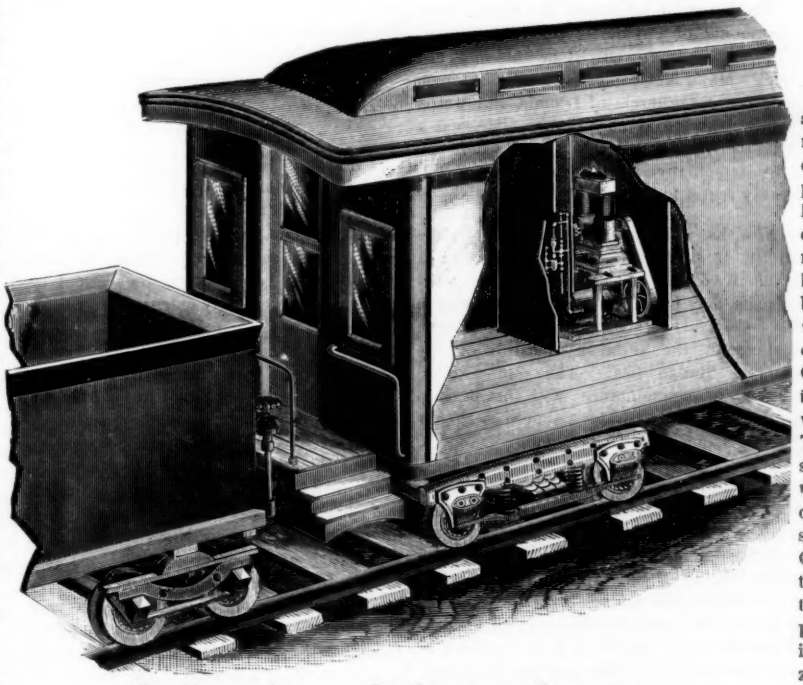
XVI.—INTERNATIONAL CONVENTION.

The United States, by its adherence to the International Convention, pledged itself to adopt legislation, as soon as possible, to harmonize the existing law of this country with the international law. The practical result that Americans need in relation to foreign patents is a period of say six months after they have secured an allowance of their United states patent to make their applications abroad without affecting the term of their United States patent.

I have thus rapidly touched upon the points in our patent law that need revision, without attempting to formulate specific additions to the statutes. This, I think, can only be done effectually by a commission of expert lawyers, such as is contemplated by the bill that we propose to introduce into Congress. In order to secure the passage of that bill, we will need the aid of every man who is interested in this subject exerted to the fullest extent. We would most earnestly urge the importance of this effort in its possible effects upon the country, and solicit your assistance in making it successful.

Lighting Cars by Electricity.

A few weeks ago mention was made in these columns of the electrically lighted train that was being fitted up by the Connecticut River Railroad Company. This system of lighting is the property of the Barrett Electric Lighting and Car Heating Company, of Springfield, Mass. The cut on this page gives a good idea of the arrangement of the system. The description below is from the *American Journal of Railway Appliances*. An entire train is lighted. The plant consists of engine and dynamo built expressly for this purpose. The engine is 7 horse power, and runs 60 lamps with ease. The dynamo is 70 light incandescent. The engine and dynamo take floor space of 20 inch square. There are ten lights to each passenger car and storage batteries of twenty-four cells, which light the entire train for two hours in case of accident to the locomotive, or if the locomotive be disconnected from the train. The cars are lighted from the storage batteries only when the dynamo is not running. The dynamo charges the storage when the cars are lighted, by giving the surplus electricity that is not consumed in lighting. The steam is taken from the locomotive through a coupling capable of carrying 150 pounds to 200 pounds steam into the engine in the baggage car, which runs the dynamo 1,500 revolutions. The engine and dynamo, being intact, the moment the steam is shut off from the locomotive, the lights are cut out automatically; the storage then takes care of the lighting. The care of lighting is very simple. Any express messenger can run the lights with a few days' experience, as all connections work automatically. The exhaust from the engine in the baggage car is turned into the steam pipes and heats the entire train.



THE BARRETT SYSTEM OF CAR LIGHTING BY ELECTRICITY.

* * The electric car question, now pending before the town council at Woonsocket, R. I., is a matter of continued controversy. The residents on South Main street are remonstrating very strongly, and claim that travel on the street has been driven off; that no horse can be safely left on the street, and as an experiment they feel it is an injury to property on the street. Several residents on the street were before the council meeting and expressed their feelings, but no action was taken, as the matter is in the hands of the town solicitor. The question promises to be thoroughly discussed, but in time will, we are sure, result in favor of the electric road.

* * An electric gas lighter has been patented by Mr. Justus B. Entz, of New York City. This invention relates to burners in which the gas is automatically turned on and a spark produced at the burner tip to ignite on closing the lighting circuit, and on closing the extinguishing circuit the gas is turned off.

Prefers the Medicine Spoon to the New Electric Method.

To the Editor of Electrical Review:

I wish to say in the language of the immortal Weller, "Don't." I am prepared to see electricity harnessed up before every possible human necessity, cooking, heating, lighting, propelling vehicles; I am even prepared to see it used in extracting teeth, and exterminating useless quadrupeds and dangerous bipeds, but I am not prepared to countenance its use in enforcing the druggist's prescription. Here I must draw the line.

Not that electricity would not accomplish the task beautifully, but there is no need. We now take five times more drugs than is good for us. Instead of trying to find out the cause of our maladies, and so learn to avoid them, we court disease by disobeying all hygienic laws, and then, when we have gone so far that Nature feels obliged to begin a curative process, we rush at once for some drugs to neutralize her efforts.

No, no, don't make it any easier to take medicine. Let us rather take the terrible Thomsonian doses that will make us more careful about resorting to medicine. Let electricity be called upon to relieve our atmosphere of coal gas, ashes and cinders, and to give our lazy muscles an occasional shock, perhaps, but let us learn to live without drugs, so that we may continue in this world long enough to see the wonders that our wonderful agent is going to perform for us in the next fifty years.

Respectfully, E. L. BENEDICT.

New York, December 26.

Electricity Cures Headache.

"Do you know," inquired a female nurse at Bellevue Hospital of a *Mail and Express* reporter, "that electricity is a most effective cure for a violent headache? I have an apparatus at home which I purchased in England two years ago. It is charged with electricity, and it cures headaches as if by magic. The apparatus is about 15 inches in length, and is composed entirely of flat or box wire links, made square. It is 1½ inches wide and ¼ of an inch thick. At each end of the apparatus is a circular cap or plate. One of the caps is made of carbon, the other is made of zinc. Two separate layers of thin wire run through the links breadthwise. These layers are divided in the center by sealing-wax, the idea being to form the electric circuit. Should the two wires touch one another the electric current would be shut off and the apparatus would be useless. On each cap is an eyelet or small ring, made to allow a string to pass through and be fastened to the head. The apparatus must be placed in vinegar for two minutes before being applied to the head. In operating, the zinc cap is placed on the right temple and the carbon cap on the left. The electric current generated by the acid of the vinegar then sets to work, and the victim of the headache is generally relieved within one or two minutes. The only objection I have to using the apparatus is that the zinc cap is sometimes so strong as to burn the flesh on the temples. I have had my right temple red for weeks after using it. Now, in applying it, I always place a cloth between the zinc cap and the skin, and I find it effective in preventing blistering. No, these apparatus are not for sale in this country. The duty would be too high on them. I paid four guineas for the one I use, and at that rate, and taking the tariff into consideration, it would cost $100 to buy one here."

—— D. L. Davis writes us that he has secured the contract for lighting Salem, Ohio, with 55 arc lights of 1,200 candle power. The contract is for five years, and must be running by April 1st next.

—— The Callender Insulating Company has appointed the Electric Improvement Company, 217 Sansom street, San Francisco, its agents in the territory covered by California, Nevada, Oregon, Arizona and Washington. For some time past the Callender Company has been shipping quantities of wire to California.

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EDITORIAL ANNOUNCEMENT.

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We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Mr. C. C. Haskins, 118 LaSalle Street, Chicago, Ill., will represent the REVIEW in the West
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NEW YORK, DECEMBER 31, 1887.

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We predict a great year for electricity in 1888.

The electrical inventor is busy every day and night.

The Electric Club will keep open house (informally) January 2d, in honor of the New Year.

The ELECTRICAL REVIEW wishes its thousands of readers (and they have vastly increased in number during the past three months) a Happy New Year.

Copper is still going up. It can well be said now that it is all "hard drawn;" at least the customer who tries to draw any away from the mine owners thinks so.

A new year is just commencing. The one that ends to-day has been most prolific in electrical progress, and who can guess what may be disclosed before the end of another twelvemonth? Whatever advances are made, the REVIEW may be depended upon to faithfully chronicle them all.

A new arc lamp, with a continuous feed attachment, has been patented, and will, no doubt, soon be heard from in electric lighting circles. The inventor is endeavoring to perfect it so it can be attached to lamps now in use. As from six to ten carbons are fed automatically and continuously, the trimmer's work is likely to be greatly lessened.

We regret to announce the death, from pneumonia, of Paymaster W. C. McGowan, U. S. N., which occurred in this city last week. Major McGowan was highly esteemed by a very large circle of friends, and was a young man of much promise. He was a member of the Electric Club, where he possessed many warm friends who will keenly regret to learn of his sudden decease.

Now that it is possible, by the aid of electricity, to photograph bullets skylarking at a velocity of 1,500 feet per second, the bugologists may hopefully gird up their loins to the task of becoming photographically intimate with the aerial gymnastics of the genuine Italian flea. The photographic method of acquaintance with his fleaship is the only one desirable—a mere passing or fleeting acquaintance, as it were.

It was remarked when the telephone men from all parts of the United States were gathered in Mr. Hall's office last week, that time seemed to have dealt gently with every one of them. When the countless aggravations that are met with by telephone men in endeavoring to please each individual subscriber are considered, it is a matter of wonder that lines of care are not more conspicuous in their generally cheerful countenances.

A company in Buenos Ayres, S. A., has recently ordered the material for a complete system of telephones from the Société Générale de Téléphonés at Paris. *Annales Industrielles* states that over two thousand subscribers have been obtained, and the company proposes to erect a tower in the river, which will serve as a maritime telephone station. The harbor of Buenos Ayres is shallow, so that vessels are obliged to anchor several miles from the city. Telephone communication by means of a tower near the anchorage will be serviceable.

We have received many words of praise over the excellence of our last edition. It was, we may be excused for stating, a comprehensive issue, exclusively reporting a number of important events, such as the telephone conference in New York, the changes in electrical circles in Chicago, the carbon war, etc., as well as presenting some of the handsomest illustrations ever appearing in an electrical journal. The fact that our Tuesday's mail brought us in forty-two new subscribers may be taken as an indication that others besides our present readers are becoming interested in the ELECTRICAL REVIEW and the work it is doing to advance the true cause of electricity.

TAKING MEDICINE ELECTRICALLY.

An esteemed correspondent presents, in another column, arguments against the use of the new electrical treatment which is to do away with the "medicine spoon," and takes us to task for favoring the innovation. We confess to an admiration of the endosmotic treatment, and can't permit a somewhat laudable effort to keep down the apothecaries' profits to stand in the path of ever-advancing electrical science. The world of experiment and enlightenment opened up for us in this direction is too great to be discarded without further investigation. What can be more beautiful and touching—*literally*—than the sight of a patient taking his dose of quinine or bromide off the end of a well-charged electrode? Or what should more quickly counteract the effects of ague and similar ills than the usual remedies brought in sudden, red-hot contact with, say, one's crazy bone? What could be more satisfying than a pinch of snuff taken endosmotically? Still, there is one cure-all, particularly popular in Kentucky, which combines in itself so many of the elements of electricity, the proper appreciation of which is dependent (we are told) on interior percolation, that the idea of permitting it to enter the system through the medium of a warm carbon applied to one's cuticle will not meet with that popular favor so necessary to the success of all reforms. We hope to learn more of this new feature in electro-medical science, and stand ready to hold up the hands of the man who feeds his powders to the electrode instead of to the "medicine spoon."

THE CARE OF MUNICIPAL ELECTRIC APPARATUS.

It would be indeed trite to enter into any line of argument to prove the importance of electric apparatus in any city, or even to recount the many uses to which it is applied; but we would call attention to the fact that, outside of the largest cities, the care of the fire alarms is generally entrusted to persons of no previous or general experience in such matters, and when any fault is discovered, its remedy is usually committed to the care of some local person of small knowledge and little practice in electrical apparatus—or the matter of repairs or renewals, however important they may be, is postponed until the direct representative of the company installing such apparatus can be summoned from the neighboring city or wherever their business center may be.

With regard to the placing of wires belonging to telegraph, telephone and messenger companies, there is but little law and less enforcement. In fact, all interested parties are better off, as a general thing, without the enforcement of such laws, on account of their obstructive nature and the difficulties which lie in the way of a consistent enforcement of them.

We have at hand a copy of an ordinance, recently enacted in a city of about fifty thousand inhabitants, constituting a city electrician, who shall be elected by the city council for a term of three years, devoting his time to the duties of the office, subject to removal only by the city council, and in receipt of a salary of twelve hundred dollars a year. To him is entrusted the care of all the electrical appliances owned by the city. He is to superintend all additions and improvements to them, and make all necessary repairs thereto, being held responsible that they shall at all times be in efficient working order. He is to have, moreover, control of the placing and changing of all electric wires within the city. It is his duty to inform himself as to the location of all telegraph, telephone or other electric wires, and the situation and condition of all electrical appliances, and to report to the mayor anything of a hazardous nature, or any violation of statute law or city ordinance, in connection with the placing of electrical wires within the city.

An ordinance covering these issues, placing the responsibility for the same upon one competent man, is certainly a needed acquisition in the care and supervision of the electrical apparatus used by any municipality.

OUR CHICAGO LETTER.

(From a Special Correspondent of the ELECTRICAL REVIEW.)

This time it was a couple of horses, over at Marion, Indiana, that added their mite to the "put 'em under the ground" theory. Marion is playing with natural gas, and one of the street arches was accidentally torn down, and the wire dropped down. Then the martyred animals ran into the wire, and both fell dead from the shock.

The coroner's jury, in the case of the theatrical electric light death at Robinson's, Cincinnati, did not materially change the account published in the REVIEW. The line, the bell wire, the speaking tube and the gas pipe were tangled up so it only required a stage manager to couple them up, and he did it.

Some farther particulars have come to the surface relative to the troubles at Wichita, Kansas. The Kansas City correspondent was slightly in error relative to the trouble, which arose from a discharged employe, who had neglected to keep his commutators in proper order. These had filled up with dirt and made trouble by short circuiting between the sections. On changing the armatures, both worked well until they again became clogged. For negligence, the party in charge was let out and a successor appointed. This was the so-called tampering with the dynamo. The valves of the pump were tampered with.

The Wichita Gas Company has 120 (including commercial) lights running. The city pays for street lamps $8.33 per month each. The system used is the Thomson-Houston. Then the Schuyler Company has a total of 258 arc lights, the city paying for these the same price as above. Originally the price agreed upon with the authorities was $6.69 per month. The Schuyler folks claimed that this was not enough, and billed them to the city—and collected, too—at $8 33. Investigation proved the justness of the claim, and the city succumbed. The Schuyler folks claim that they are now paying 4 per cent. on the investment.

The Winfield (Kas.) Construction and Supply Company recently secured a five years' contract with that city for lights at $10 to $20 per annum, being bound to commence operations within sixty days, and have the dynamos running at the expiration of ninety days. The time was extended and the franchise modified, so that $10 per annum was to be the price for all-night lights, and $1 per month for incandescents. This is the seventh franchise granted by the authorities of Winfield; but up to the latest advices the Gas Company is holding the fort and waving back the answer with true orthodox defiance.

Up at Menasha, Wis., on the contrary, the gas company has been stood upon its head, and the city has been madly waving its arms, and crying for "more light." The city offered its twin sister, Neenah, a gas-lighting franchise on a basis of $1.50, but the bills came in $2.50 per thousand. The two children are now at swords' points, and Menasha wants electric lights. The town has sufficient hotel accommodations for a limited number of agents, if application is made at once.

The Mather Company, which means, J. H. Reid, has just given Ft. Collins, Col. a plant of 250 incandescent lamps, and set another up for the Upham Manufacturing Company, at Marshfield, Wis.

In the recent unpleasantness between the Chicago authorities and the anarchists, not one of the culprits' necks was broken—all were slowly choked to death. While the taking of these would-be law-makers' lives was just the right thing to do, there is such a thing as doing an unpleasant act of that nature with more expedition and less brutality. When it has been so often demonstrated that electricity is quicker in its action than nervous sensation, and that a shock sufficiently strong to produce instantaneous death without warning of any kind, may be given noiselessly and instantaneously, what sensible man can find any possible objection to the electrical method of capital punishment? It is not even necessary for the condemned man to know when

the blow is to fall—it may be given during sleep, and would be as painless and humane as possible.

There is one other method which was proposed during the discussions which were born of the anarchists' cases. It was suggested that so soon as the day of the execution should be definitely settled, a little package of morphine, sufficient to produce death, should be given the condemned, and the alternative given him of waiting for the sheriff, or introducing himself to the ferryman by swallowing the dose.

Just so sure as straws show the direction of the wind, so sure there is a flutter among the stockholders of Drawbaugh and Pan Electric and other wild telephone stocks, every time there is action due from the courts on the much vexed telephone question.

It is now about that season of the year, and it is not difficult to hunt up the interested parties.

Some morning you pick up your daily breakfast reading, and stumble on a letter (special) from Washington, which rehashes the old charges of monopoly, of infamy, of wrong, of—well, pretty much everything under the sun which is unpleasant to the taste or smell, that the Bell Company is accused of.

Then comes a dose of very finely comminuted praise dust for poor Mr. So-and-so, who was making and selling and using telephones way back in Geo. Washington's time, and, if you don't believe it, he has two of the screws and one of the coils from his first telephone, to show for it.

Then the Chief Justice and each and all of the members of the Supreme Court, have winked in a mysterious way, or spit a little differently from their usual methods, and the conclusion is unavoidable that Bell's patent is to be thrown into the public domain, and Jones, or Brown, or Judkins, is to be decreed his successor, depending in each instance upon whether the paper owns Jones or Brown or Judkin's stock.

The city man writes one or two funny squibs, and distributes through the local columns little excerpts like: "The monopoly is doomed," "The Bell is to be wrung," etc., and the thunderer of the sheet writes up an editorial on the situation; and all the while the cashier holds dismal carnival over a goodly block of stocks,

> Which somebody wishes to sell
> Yet none can be found who will buy;
> The value of which none can tell,
> To seek which no fellow will try.

If not out of place, it may be well to state right here two facts, which, at first sight, seem wide apart, but which gradually near each other as we think this matter over, apropos of the newspaper man and the high legal tribunal.

Supreme Courts don't leak. Stocks in doubtful enterprises are poor pay for advertisements. Top column, reading matter, leaded as editorial.

Chicago's city plant will be running full by the first of January. Christmas eve saw the start made, and it went off all right, as everything does that Prof. Barrett tackles.

The professor has been for some time preparing statistics on lighting the central portion of the city with electricity. In this report he quite thoroughly goes into details of incandescent—multiple and municipal—series and arc lighting, and brings forth a formidable array of figures.

Chicago has long enjoyed the reputation of a slow, old fogy town, in the matter of lighting and of lighting privileges. She has had the satisfaction of knowing that she has lost nothing by being conservative, and that today the lines in the Chicago conduits, in addition to being out of the way, are better insulated than those of any other city in the country where overhead wires are permitted. She is having a Merry Christmas and a Happy New Year over it, and is satisfied.

C. C. H.

Chicago, Dec. 26, 1887.

The latest method suggested for driving dynamos for electric lighting on trains is the use of a windmill on the top of the cars. There is sufficient power, but how to store it seems to be a difficulty. This is a French invention. It will take a Yankee to develop it.—*Railway Review.*

OUR BOSTON LETTER.

(From a special correspondent of the ELECTRICAL REVIEW.)

Prof. Dolbear, of Tufts College, entertained a large audience at the Electric Club rooms on Monday evening last, delivering a lecture "Concerning the Nature of Electricity," as his subject was shrewdly worded. Prof. Dolbear began with the statement that we are never conscious of phenomena unless we can trace matter and ether, or matter and motion, or ether and motion. Matter and motion were defined. It is an important physical principle that action depends on the kind of motion taking place, this being applicable also to molecular action. Motion in a free path, changed to a vibratory motion, constitutes heat. An example of this change is seen in the case of a bullet striking a target. The heat generated by striking a blow upon a leaden bullet was shown by experiment to be sufficient to cause a current in a thermopile, connected with a galvanometer, so arranged that its deflections were reflected on a screen. We put in a particular kind of motion and get another. Nothing but motion was received, and nothing but motion could have traveled along the copper wires connecting with the galvanometer. The same principle was illustrated in many ways, the motion employed being the molecular motion of chemical decomposition, the mechanical motion of the dynamo in various forms, etc. The current passing through Crooke's tubes, the swiftly moving molecules moving a small paddle-wheel in the tube. The professor next illustrated that the motion can be changed again into vibratory motion or heat, bringing a platinum wire up to incandescence, and finally fusing it by passing through a current from chemical batteries. The vibratory motion of the molecules finally broke the wire apart. For the origin of the heat we look to motion. Electricity must be some form of molecular motion. The part played by ether in conveying this form of motion, illustrated by the familiar experiment of suspending a compass needle above and parallel to a copper wire and noting its deflection upon passing a current through the wire, was next discussed. This ether cannot be matter in the ordinary sense of the word. If motion is indispensable to electricity, it follows that the result is a form of motion, and not a "*tertium quid*," which can be summoned, like a ghost, to frighten man, or render him a service and then cease to be.

Before the lecture a congratulatory telegram was sent from the club to the Chicago Electric Club, then holding the first meeting in their new club house.

The Sawyer-Man Company are putting in a 300 light plant at Saccarappa, Me., and another of 75 lights for the Harvard mills at Watertown, Mass. This company is also to supply the Everett Piano Company of this city with 163 lights.

The Edison Company have just established their second district station on Hawkins street, so Boston is the first city in the world to have two Edison stations running.

The 600 light plant of the American and United States systems at St. Paul, Minn., has been removed, and the Thomson-Houston system put in.

The Board of Judges on electrical subjects at the recent charitable Mechanics Fair, was: C. J. H. Woodbury, chairman; Prof. John Trowbridge, Prof. Silas Holman, and Mr. J. A. Fielden.

The Observatory Hill railroad at Allegheny City, Penn., operated on the Bentley-Knight system, with Thomson-Houston motors, is reported working very successfully. Steep grades are ascended at a rate of six miles an hour.

The Weston motor car has been making more successful trips around the city tracks. It is claimed that it ascended the Cambridge street hill at a rate of 2.84 miles an hour with ten horse power, while the car of another company went only at the rate of 2.50 miles an hour with greater horse power, other conditions being the same.

Mr. W. J. Stanley's lecture before the Society of Arts was largely attended, Thursday evening. Among those noticed were: President Ridlon, of the Electric Club; Mr. C. J. H. Woodbury, Mr. Blodgett, electrician of the Boston and Albany R. R.; Profs. Cross, Holman, Faunce, Woodbridge and Clark, of the Institute of Technoloy; President-elect Alexander, of the Electric Club; Mr. Garratt, of *Modern Light and Heat;* Mr. Caldwell, of the Edison Company; Messrs. Brown and White, of the same company; Mr. Blake, of the Sprague Company, and Messrs. Curtiss, Sears and Hadaway, of the Thomson-Houston Company.

A Westinghouse dynamo was set up solely to illustrate the lecture.

The Thomson-Houston Company are lighting Prof. Holman's new residence at Auburndale, Mass.

Another car fitted up with the Sprague motor will be running in the course of two weeks.

Mr. H. C. Spaulding, a recent technology graduate, has become connected with the Thomson-Houston motor department. Mr. Spaulding is bright and active, and has every qualification for success.

Mr. Garfield, of the Thomson-Houston Company, has just returned from another extended southern trip, upon which he has been combining business with much-needed relaxation and change of scene. He reports himself feeling 100 per cent. better, and his looks do not belie the words. T. W. S.

Boston, Dec. 26, 1887.

OUR OMAHA LETTER.

(From a special correspondent of the ELECTRICAL REVIEW.)

The final awards in the celebrated litigation between the Sperry Electric Light and Motor Company and the Northwest Light and Power Company, which was begun several years ago, were filed with the clerk of the United States District Court here last week. In 1885 these companies were competitors in the illuminating business in this city. On the 20th of April of that year they consolidated, under the style of the Omaha Electric Light Company. The management of the new company was vested in a board of directors. In January, 1886, C. E. Mayne, the president of the Sperry Company, took forcible possession of the affairs of the consolidated firm. The Northwestern Company replevined its original property, and brought suit for damages against the whilom Sperry Company. Arbitration was finally agreed upon by all parties concerned, with George E. Barker to represent the Sperry wing, and Clark Woodman the Northwestern. The claim of the latter was for non-fulfillment of contract, supplies, cash advanced, loss of profits, and damages for various causes, in total amounting to $14,789.91. On the other hand the Sperry people offset this with claims of a similar character, aggregating $15,000. After a review of volumes of evidence the arbitrators failed to agree, and an attorney was brought into the case as referee. Then there was another overhauling, and then came the decision. It was found that the Sperry Company had failed to comply with the requisites of the consolidating contract, and the Northwestern Company was awarded $7,275.31. Each Company was ordered to pay one-half the outstanding indebtedness and one-half the expenses of the arbitration, amounting to $1,114.70. The creditors of the consolidated company are especially happy over the decision.

Z. T. Lindsey, while selling goods in the West, had his sample trunks left at South Pueblo, Colo. At Canyon City he telegraphed to have them forwarded to Salida. The telegram read Salt Lake, where it was delivered, and thither the trunks were sent. Mr. Lindsey lost a week's time and expended $27 in recovering his trunks. He brought suit against the Western Union for damages. Judge Loofbourow, of Omaha, said there was no question but that there were decisions in the State to the effect that these printed conditions were reasonable, and that they constituted a contract. It had been held in this State that the business was such that mistakes could not but occur, and that the fact of a mistake occurring was not sufficient evidence of neglect on the part of the company. It seemed to him, however, that the character of the mistake in some cases might indicate whether there was neglect or not. This mistake he thought could have been caused by nothing else than carelessness. He therefore granted Lindsey judgment for $27, but not for special damages, for which, he said, another suit would have to be filed. Both Lindsey and the Western Union appealed to the Supreme Court.

Another accident has occurred to the electric light plant in Council Bluffs. Last Friday evening the safety cap of the cylinder of the engine was blown off. No duplicate was at hand, and the engine is off duty, awaiting the arrival of a new safety cap from Springfield, Ill. The accident happened while the engine, which is a new one, and had been obtained as an extra, was being tested. The accident had no effect on the operation of the plant.

Flemon Drake, of the Nebraska Telephone Company, has been compelled to notify all his Omaha subscribers that an unauthorized and inaccurate telephone directory has been issued by certain parties, and cautions subscribers not to use it.

Fremont's (Neb.) electric light system has been placed in operation, and is working satisfactorily.

The telephone exchange at Norfolk, Neb., failed to connect with sufficient support, and is hung up for the present. PING.

Omaha, Dec. 24, 1887.

Electricalities.

Did you ever think what was in a name? The Beetle has no flies on him; Doolittle does work enough for six men; Goodyear is very wicked; Insull insulates wire and does it well; Lyman is a man of truth; Madden is ever in a good humor; Manson is of course a man's son; Mason, a brick; Noyes, very quiet; Patterson, who was never struck; Storke, who is fond of—water; Chapin, who is always in to callers; Frost, who is never chilly; Glasier, who should mend his ways; Porter, who takes up a collection: Waterhouse, who never drinks rum; Woodbury, who is opposed to underground wires, and Candee, thought to be sweet by all the ladies.

There were a number of good story-tellers among the telephone men in the city last week. Frank Beach presented one that the listeners haven't recovered from yet.

The fine electric illumination at the Winter Carnival, Fleetwood Park, New York, is attracting much favorable notice. The great tobogganing slides were thrown open to the public on Saturday, and were enthusiastically patronized. The electric lights, 100 in number, were of the Thomson-Houston system, and were installed by Mr. John J. Moore for the North New York Lighting Company. The lights are suspended on poles in different parts of the grounds and give a brilliant effect to the merry scene.

Electric Car-Lighting in Russian Tunnels.

Annales Industrielles gives an account of a method for lighting the fast trains from Kieff to Odessa, in Russia, by means of electricity. The object is to light the cars during the day while passing through tunnels. The plant consists of a powerful Crompton compound dynamo machine, which supplies a current of 110 volts electromotive force. There are three circuits of 2,000, 1,460, and 6,540 feet respectively. The rails are used for the return conductor, and the other wires are laid in a central tunnel between the tracks. Contact is made in each tunnel with the wire for that circuit by contact pulleys on the car axles. Each car has its own contact with the wire, so that all complicated connections of coupling a train are avoided. The train may stop while in the tunnel and the system will continue to operate. The company has applied the system to seventy-four cars, and they report that the expense of the system is less than one-third the cost of gas.

*** Daniel Drawbaugh is reported to be at work on a new electrical contrivance for signaling long distances.

*** It was remarked what a handsome set of fellows were the telephone officials who visited New York last week.

*** There is an alderman in Chicago, Wheeler by name, who wants the telephone company to pay a yearly tax of $25 per instrument.

*** The New York telephone investigating committee has closed its hearings. The last sitting was held at Rochester, where the testimony of J. Meyers, H. L. Storke and others was heard.

*** "Where will the Telephone Monopoly End?" inquires an excited exchange. One end is at the subscriber's telephone, where it enters the ground, the other at the exchange. When metallic circuits become universal the telephone line will be endless. See?

*** The Nebraska Telephone Company has to do with the annoyance of an unauthorized telephone directory, which has been the cause of numerous errors. General Manager Drake applied the remedy of prohibiting their use, and telephone service in Omaha is again satisfactory.

*** Messrs. J. H. Bunnell & Co., of New York, have enjoyed a great business in Leclanche batteries of their own make, having sent out over 200,000 in the past four years. What makes it very gratifying to the makers is the fact that all of this large number gave satisfaction.

*** The telephone investigating committee has proved a good receiver for cranks, a transmitter of plenty of statistics and an exchange of warm civilities. And then two of its members have already been put underground, having failed of re-election. The committee is fulfilling its functions.—*N. Y. Tribune.*

*** The following are the statistics of the use of the telephone in Italy up to 31st of October last:

	Subscribers.
Venice	268
Naples	992
Palermo	520
Catania	232
Messina	183
Milan	1,213
Turin	681
Genoa	409
Florence	748
Bologna	375
Legborn	388
Rome	1,835

*** There are 341,670 telephones in use in this country. They will average twenty "hellos" apiece for 313 working days in the year, or 2,138,854,200 "hellos" in all. Multiply this sum by one-half and divide that by three-fourths and you have the total number of times they won't work, and the square of the perpendicular, subtracted from the square of the hypothenuse, will give the square of the base language that follows.—P. S. If the statistics editor hadn't gone out suddenly, we could tell just how far the combined "hellos" could be heard if they were placed end to end.—*Springfield Union.*

*** The primary battery introduced by Mr. C. M. Newton consists of alternate plates of zinc and iron, the latter of which forms the negative electrode, and has fixed against it plates of litharge, which act as depolarizers. The exciting fluid is caustic soda, which dissolves the zinc, forming an alkaline zincate, whilst at the same time hydrogen is disengaged at the iron electrode, but meeting there with the lead oxide, it robs this of its oxygen, forming water. The litharge is thus reduced in part to a suboxide and partly to metallic lead. A cell constructed in this way has, it is stated, an electromotive force of .69 volts, which, after furnishing a current for 130 hours is reduced to .61 volts.

Telegraph and Telephone Pipes in Boston.

The Western Union Telegraph Company laid, about two years ago, two tubes containing wires through State, Washington and Friend streets to the Eastern station on Causeway street. These are the only underground wires used by the company in Boston.

About five miles of underground conduits are used by the New England Telephone and Telegraph Company, the number of ducts in the conduits varying from two to twelve. Each duct has, under the present system, two hundred wires; but with the metallic circuits which are being introduced, only seventy-five wires can be held in each duct. One conduit now goes from the central station, at the corner of Pearl and Franklin streets, through Pearl, Congress, State and Exchange streets to Dock square; here it divides, one conduit going through Union, Endicott and Beverley streets to Warren Bridge, while a spur line runs through Brattle, Court and Cambridge streets to Staniford street. There is a conduit from the central station up Franklin street to Washington, and a spur line runs through Arch and Chauncy streets, Harrison avenue, Beach, La Grange and Tremont streets to Ruggles street. There is also a conduit from the South End office to the Back Bay.

Underground Work in New York City.

A meeting of the Board of Electrical Control was held last week. The proceedings consisted very largely of the reading of many documents by Commissioner Gibbens. Although the Mayor reclined his head upon his hand with an air of "You make me tired," he proved to be wide awake. Thus, when the Mutual District Messenger Company was referred to, the Mayor broke out:

"Is there any law or ordinance justifying these people in coming into a man's house and putting up posts and wires on his roof without his consent?" All the members of the Board agreed that nobody could have such a right. Then the Mayor added: "I only ask because recently a man came to my house and displayed a badge and said he was going up on the roof."

Commissioner Gibbens read a very long and spirited correspondence that has been going on between Eugene T. Lynch president of the United States Illuminating Company, and President Hess, of the Board of Electrical Control. The Board directed the company to put its wires into the conduit at various points. The company declined to comply until it should be demonstrated in some way that the business of the company could be conducted through the conduit. Mr Lynch said that his company could not afford to give up its present system of poles and wires at the risk of losing all its business; that it could get no definite information of the cost of using the subway, and that the indications were that the charges of the Subway Company would exceed the revenue of the company in some instances

Mayor Hewitt said that Mr. Gibbens was responsible for a delay in the extension of electric lighting, due to the fact that companies can get no permits to put up poles in districts where there are no conduits.

Mr. Gibbens said he was glad to be able to take the burden of responsibility off the Mayor's shoulders. He added that he would be glad to help the Mayor in any other way. The Mayor jocularly suggested that Mr. Gibbens should help buy some rattles for the babies on Randall's Island. Mr. Gibbens said he would be happy to help the Mayor, and Commissioner Moss pulled out his wallet and proposed to contribute on the spot.

There are now 254,250 feet of single ducts in the conduits. The Western Union Telegraph Company has 500 miles of wire laid. The Metropolitan Telegraph and Telephone Company has 1,000 miles laid, principally along Sixth avenue. The companies are notified to get their wires underground in ninety days wherever conduits are ready.

Commissioner Gibbens moved that the Mayor be requested to direct the Commissioner of Public Works to remove the poles and wires on certain streets when the conduit has been ready ninety days and when the companies, after due notice, have failed to put their wires in the conduits. He enumerated six poles belonging to the Metropolitan Telephone Company, in Sixth avenue, and other poles belonging to the United States Illuminating Company, in Twenty-fifth street. The resolution was passed. Mayor Hewitt was not prepared to say what he would do. If he does issue the order the great fight of the electric companies with the Subway Company will have fairly begun.

The Postal Telegraph Scheme.—There is No Constitutional Power.

We have opposed the establishment of a Government postal telegraph system upon grounds of inexpediency, founded, as we conceive, on perfectly solid objections; and now the time has come for the question of constitutional authority.

This is not a question of strict or liberal construction. It is a question of plain and obvious construction, according to all the canons of sound interpretation.

There is but one of the express powers of Congress to which a postal telegraph, as a Government institution, can be referred. It is the power "to establish post offices and post roads." What was meant by a post office and a post road is perfectly manifest.

A post office was an office for the reception and delivery of letters and other matter usually carried in the mails, of which there was, before the revolution, a system extending from Maine to Georgia, through the intermediate colonies, with here and there a few cross-posts. Sometimes the mails were carried in stage coaches or wagons, and sometimes on horseback. Of this system, the headquarters being at Philadelphia, Dr. Franklin was, during the colonial times, for some years before the Declaration of Independence, the head. The Continental Congress assumed the control and management of that system; but when the Constitution was framed, the post office was nothing but an establishment for the reception of letters and other matter usually carried in the mails under the management of the Continental Government, and for the delivery of such letters and other mail matter at the places of destination A post road was a highway established or adopted by authority of Government, as a route over which the mails were to be carried from one designated point to another, with intervening stations for opening the mails destined for intermediate places, and making up mails that were to be carried further.

The idea of construing such words as post offices and post roads, so as to make them include every possible mode in which individuals can communicate with each other, when they cannot see and converse with each other, is inadmissible upon any sound rule of interpretation. Words of specific and limited meaning cannot be stretched so as to embrace every scientific or mechanical discovery or invention made long after the words were used in a public instrument.

Congress has power "to declare war," and this comprehends an implied power to carry on war, and to use any instrument of war, whenever invented; so that muskets with percussion locks, made long after the Constitution was established, can be used in place of flint or match locks. Congress has power "to provide and maintain a navy." When this power was granted, ships were sailing vessels, not propelled by steam. But steam or any other propelling power can be used in the navy, because the power to provide and maintain a navy is general, and comprehends everything, from age to age, by which a navy can be made efficient. But the power to establish post offices and post roads is specific, not general. It comprehends described and limited things, and those things must be determined by the meaning of the words when they were used.

Suppose that the framers of the Constitution and the generation that established it had been told that a mode had been discovered by which an impulse could be transmitted along a wire for 1,000 miles, by which a delicate instrument at the other end of the wire would be made to record words or signs on a piece of paper, or made to produce certain sounds which a listener could translate into words or letters, according to an adopted method! Imagine Benjamin Franklin, the philosopher, statesman, and legislator, using the words "post office" and "post road" to describe or comprehend the telegraph! Imagine Governor Morris, who revised every word of the Constitution in its final draft, assuming that the post office and post road would be held to comprehend every possible future means by which individuals widely apart could communicate with each other! The truth is plainly that a telegraph is not a post office and a telegraph wire is not a post road.

In order to get constitutional authority for the Government to establish what is now called a postal telegraph, as of or under the post office system, the Constitution must be amended. To do it under the present text of the Constitution would be sheer usurpation. Still, it is quite possible that it may be done, for limitations of constitutional power are not looked upon nowadays with much favor, not even by many of those professing to be Democrats.—*N. Y. Sun.*

How Western Union Works.

A Thousand Busy Operators—Stealing Messages for Speculators.

When a person goes into the basement of the Western Union Telegraph Building, and desires to inform his wife at San Francisco, 3,000 miles away, that New York is a wonderful place, and deposits a dollar bill for that purpose, he little imagines the extent to which his dollar supports his averment. He little imagines what the dollar does before the message reaches the first telegraph pole out from the building on its way across the continent. None of man's conquests are more amazing than his conquest of the lightning, and none of the strange things he does with it has reached such proportions as his employment of it in the capacity of an errand-boy. While this has been growing commonplace, it has all the while been growing more and more amazing, and in the central office of this king of corporations, the Western Union, the process of telegraphy has reached a development such as can be seen nowhere else in the world. The dollar that pays for the transmission of an idea from Hell Gate to the Golden Gate does many interesting things.

It goes in at the receiving window and gets registered, together with the message it represents. Then it proceeds down-stairs into the cellar, where it turns the wheels of fifteen mighty engines. One of these, applied to a huge dynamo magnet, draws from it the flame of 600 incandescent lamps, and sends it gleaming through the building. Three others engage actively in the work of enlightening the world. They supply the electric current that courses up and down the continent faster than light itself. They take it from fifteen little dynamo magnets, scarcely thicker than a man's thigh, arranged in rows or "gangs" of five each, and placed in a room scarcely larger than a hall bedroom. If two entire floors of the building were filled with Leyden jars, there would be, maybe, 40,000 of them. But the power to be got from them all would be less than that derived from these little dynamos. Four other engines, the largest and most powerful of all, force currents of air through the most extensive underground pneumatic systems in the world. Tubes run from the building up to the branch office in Twenty-third street, to other branch offices, and to all the principal newspaper offices. If the tubes were large enough to accommodate a man he could be sent bowling along two miles underground in just ninety seconds with as much ease as if he were a feather.

It is up in the top of the building, however, that the novel sights are to be found. Seated in front of 700 little desks, each supplied with two or more noisy machines that clatter incessantly from year's end to year's end, is an army of young men and girls, the brightest, quickest, cleverest operators to be secured. Everything and everybody appear to be in a grand rush. Little boys and girls tear about as if thrones depended on their being at a given point in the room at the hundredth part of a given second. The continuous musketry of the sharp, rattling machines ever and anon grows heavier and fiercer as gusts break forth on a stormy April day. The very atmosphere seems excited and in a hurry, and well it may, for the air in the room is changed every three minutes. Four huge ventilating fans, driven by a special dynamo engine, carry off 2,000 cubic feet of air every second, and keep the atmosphere in perpetual commotion. A picture of a scene so confusing is difficult to paint. If anything would only stand still long enough to let the mental camera catch its image, there might be hope of obtaining at least a typical impression. But the room puts on as many new phases as the crowd that passes a Broadway corner. Placed well in its center is a little pagoda, an upraised stand that might make a summer-house, were it set in a flower garden and overrun with vines. Here a group of little girls sit behind a circular table. Over their heads is gathered in a disk a hundred wires that run hither and thither all over the room, carrying little messenger

cars, such as they have in the big stores running to the cashier's desk. Here there are so many of them, and they skim along in so many different directions, darting hither and thither, as if blessed with a head of their own and a perfect comprehension of their own business, which nobody can tell them better than they know it themselves, that one looks upon their intricate mechanism with amazement, and wonders why they don't come together in a general collision. If it be remarkable that they understand themselves, it is more remarkable still that these little girls, who have scarcely entered their teens, should know whence they all come, what they all carry and where they all go. But with equal deftness and celerity, the children capture them all as they come, take out their cargoes of papers, affix to these a proper stamp, and send them whirling off again, all in the twinkling of an eye. When the messages have been received down on the basement floor, they are sucked through pneumatic tubes up into the operating room, and there seized upon by the little girls in the grand stand. Quick as a flash the addresses are read, and then they are whirled to that part of the room in which the particular operators are seated who work the particular lines over which the message is to go.

It takes nearly a thousand operators to accomplish a day's business in the Western Union. Some of this work is in the day time and some at night, and others do nothing except relieve the regular staff, while, in relays of fifty or seventy-five, they go up-stairs for luncheon. Thus there is no pause in the eternal rattle of the machines. The problem of perpetual motion is solved in that room as much as it ever can be solved. The messages that come into the office are treated pretty much in the same way as those that go out. The operators who receive them write them out on blanks and send them whizzing off in a jiffy to the little girls in the grand stand. When they are stamped for identification they are dropped down through a sliding tube to the basement floor. A mirror at the bottom enables one to see directly through six stories and catch glimpses of the pig-tails and curly bangs up in the lofty grand stand. As the messages drop they are taken out, slid through steam rollers that copy them, and drop them on a revolving, endless belt, that takes them off to the routing clerks and the messengers. System is always simple, even in its most complicated forms. That is what system means. And yet the number of things that are done to a message in order to insure its rapid and accurate reception and delivery can but excite wonder.

Of course there are a great many secrets passing through that operating room—secrets that speculators in Wall street would consider it well worth their while to know. Many a fact that has come over the wires from Chicago, addressed to some prince of the realm of speculation at 12 o'clock, if known an hour later to any important stock broker, would be held by him in high commercial esteem. This fact has not escaped the observation of operators who keep a business eye open, nor is the Western Union Company wholly blind to it. Arrangements have occasionally been made, in times of public excitement, between operators and men of speculative tendencies, for the quick transfer of messages designed to have important effects on public affairs. There are many occasions when the certain knowledge of an event—a presidential proclamation, a government concession to, or demand upon, one of the subsidized railroads, or of any such thing affecting the values of securities—should it come to the ears of a speculator even half an hour before it was made public, would enable him to make a fortune. The secrets of the wires are the richest kind of secrets, and the greatest care is taken to keep them inviolable. This is one of several reasons why the operators are not permitted to take their luncheon outside of the building. A restaurant is fitted up for them on the topmost floor, provided with an extensive bill of fare, which is scheduled, according to the company, at cost prices. A sharp espionage is kept upon the movements of all employes. At the door of the big room stands an old, white-haired sentinel, whose forty years of telegraphic experience in all parts of the country has made him familiar with every one in the business. If a visitor calls, he either knows him at once or knows that he is not a fellow-craftsman. At all times of unusual public excitement, when Wall street is in a fever, extraordinary vigilance is exercised over all persons who call on the operators. They are always compelled to send in cards. These are taken first to the manager or his assistants. The person called upon is notified, and if he desires to see the visitor he goes out into the hall. The opportunities for long or private conversation here are meager. A constant succession of chief operators and other authoritative persons is passing by at momentary intervals If secrets are being divulged the chances are that some part of them will be overheard, or suspicion aroused by some other circumstance. In that event the visitor is followed. It is not often that important secrets have contrived to get over this wall of scrutiny and care.

To the uninitiated it is a great puzzle how the dangers of lightning are averted where there are so many conductors of electricity as in a telegraph office. More than 2,000 different wires come into the Western Union building, and run more or less directly to the desks of the operators. Even when these electric attractions are wanting, most people confess to a certain feeling of insecurity when the elements rage and wake up terrifying flashes of forked fury. Nearly half the operators are young women, and they may be expected to share the general sentiments of their sex concerning this uncertain and wicked-looking force. But science has provided an answer to this, as well as to almost all other puzzles which stand in the way of human progress. Every wire, as it enters the building, passes through the bottom of a long narrow board, and then again through it at the top. This board is a lightning arrester. If the current is heavy, its first effect is to deprive it of much of its force. Should even this fail to deprive the current of its fatal power, and it passes on to the top of the board, it touches a spring which drops instantly and shuts off all connection with the operating room. This spring is called the plush magnet, and beyond it no overcharge of lightning, whether proceeding from a storm or from contact with other wires, can possibly go. Absolute security from outside electrical influences is thus insured. The wires proceed directly from the street to the switchboard in the operating room, where they are stopped. The wires attached to the machines in the room all run to this board, and connections are established there with the through lines.

There are 20,000 cities and villages in the United States to which the Western Union runs its wires, and naturally the task of making rates between each of these places and all the others is a grave problem. Four hundred millions of rates must be made, and every agent must know them all. When the company was confined to the space between Buffalo and Chicago the process of arranging a tariff was comparatively simple. But when a boundless continent became its domain, the subject was no longer insignificant. The present method is so plain that the wayfaring man, though a fool, has no excuse for erring therein. The whole country is blocked out on a map in squares of fifty miles each, and the rate is fixed between each and all of these squares, and printed in a book that is newly revised and issued every six months. The public is greatly indebted to the competition of the smaller companies which from time to time have sprung up as rivals within certain territories to the Western Union for many additional simplifications of this system. In the East there is but one tariff rate, and between adjoining States a similar arrangement usually exists. These smaller companies have been nearly all swallowed up in the Western Union, but their usefulness to the public in compelling reductions is not slight. The average business done in the main office of this giant monopoly is about 1,400 messages. As many as 2,800 have been sent out in a single day, and as 180 other offices are open in this city, these figures tell only a small part of the story. But they serve well to show the immense development of an art and a trade that sprang into existence within the memory of men still young, and which, were they suddenly lost to human knowledge and craft, would leave the world in strange and dismal darkness.—*New York Tribune.*

New Method of Telegraphing.

The announcement in a daily paper that "occult telegraphy" would be practically illustrated at Adelphi Hall, New York, caught the eye of George A. Mudgett, a wide-awake veteran telegraph operator, who is employed in the Western Union's cable office, in Broad street. Mudgett is never happy unless he is investigating something new in electrical science. He is Yankee inquisitiveness personified in regard to all such matters. His friend and fellow-operator, William S. Price, is much the same, and hence, as a matter of course, they went to see this discovery together, said to be by one Dr. L. W. Sapp, of Cleveland. On arriving at the hall they found about three hundred people assembled, eagerly awaiting the Ohio man's exhibition. Chairman Newton introduced Dr. Sapp, who was warmly received. The great discoverer is a middle-aged man, stoutly built and rather good looking. There was nothing, however, striking in his appearance or in his remarks. Telegraphy, he said, was rather out of his line. He was, in fact, only an amateur in the business, but, despite this, the spirits would send him all sorts of information, even going so far as to prescribe for his patients when requested to do so.

Then he went on to say that the spirits did not communicate with him through the Morse code of signals, but had promised to do so at the end of three months, and had directed him to have then a practical telegraph operator to take down what they said. In the meantime they would talk to him through a private code, which he understood and would translate to the audience. His apparatus, which stood on the platform, consisted of an ordinary telegraph table with a Callaud battery. In place of the ordinary wooden sounding-board he used one side, or rather one leaf, of a mahogany-framed folding school slate. The other leaf covered the transmitter, which consisted of the regular Morse key and a rubber lever in place of the ordinary metal one. The rubber lever, he explained, suited the spirits better. When he brought the upper leaf of the slate down towards the transmitter, it was so adjusted that while the circuit was not closed, it looked as though this could be done easily by either a slight pressure on the slate or an imperceptible jar of the table, such as could be given by the hands. After making his connections, which he ran all right, the Doctor sat down, placed his hands on the slates, and in a little while the instrument began to tick, to the astonishment of nearly everybody in the room except the two Western Union men.

At first the doctor made a few scattering "dots" Then came five of these together, and Mudgett and Price recognized the Morse P. Dr. Sapp, however, told the audience that, according to his code, it meant "we are." This was all right until he happened to repeat the same signal a little later, when he translated it as meaning "all working." Price and Mudgett began to smile. In a short time they heard the Morse figure 3—three dots, a dash and a dot—given and interpreted as meaning "this instrument." The young men could not restrain their feelings any longer. They began to laugh. A tall gentleman near them, noticing this, arose and asked the chairman if a practical operator would be allowed to go on the stage. Mr. Newton replied that this was unnecessary, as the instrument could be heard all over the hall. "Are you an operator?" broke in Dr. Sapp, who seemed ill at ease. "No, but I wish I was," said the interrupter. The doctor seemed encouraged by this, and boldly declared that anyone might come forward and receive signals His invitation was at once accepted by Price. He was cautioned not to move his hands after placing them on the slates. By this time the audience was worked up. Price sat down and found that with the slightest pressure of his hands he could make all the signals he pleased. He spelled out Mudgett's name, and then added: "George, this is the biggest kind of a fraud." He expressed the same sentiments in plain English to those around him, to the great dismay of Dr. Sapp.

Hearing this the people became more demonstrative. Some sided with the doctor, but the great majority were disgusted, and expressed their feelings without much reserve. The doctor bore all that was said meekly, merely remarking that the spirits never did so well in a public hall as they did in his own room. "But how did you get signals, doctor?" someone asked.

"I cannot tell, my friend," was his reply. "It is a question I cannot answer."

TELEGRAPHIC

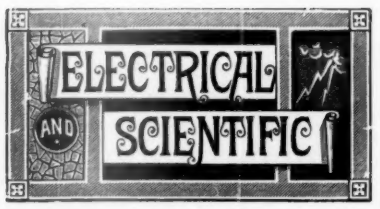
... The verdict of $250,000, obtained by James H. Goodsell in his suit against the Western Union Telegraph Company, has been set aside by the general term of the Supreme Court, and a new trial has been ordered. Mr. Goodsell, in his original complaint, set forth two causes of action. He claimed that a balance of $32,000 was due him from the Western Union Company under a contract, the responsibilities of which had been assumed by that company, but which had originally been made by Mr. Goodsell with the Atlantic and Pacific Telegraph Company for the dissemination of the news of his national press association. He also claimed $650,000 for the alleged breach of that contract.

.... When "The Mikado" was produced for the first time in New York a critic forwarded an account of the performance to his paper in the West. The report was to be "dropped" to a newspaper in Detroit. In giving the cast, the character of Ko-Ko occurred, and the New York operator ticked off the letters, first inserting quotation points and ending with the same. It happens that the telegraphic code sign for a colon is k o, and the Detroit operator, who had probably never heard of "The Mikado," and was ignorant of the existence of such a personage as the Lord High Executioner, very carefully jotted down ":," and followed it with the actor's name. It passed the editors, printers and proof-readers, and was published as the telegraph operator had interpreted the word.

.... Judge Noonan, of the Bexar county, Tex., district court, granted an injunction last week restraining the San Antonio Gas Company from erecting street poles on which to string its electric wires for furnishing the city with electric lights. The application for the injunction was made by the Western Union Telegraph Company, joined by the San Antonio Electric Light and Power Company, the latter now supplying a large numb r of private parties with the Houston-Thomson arc light. The gas company has permission from the council to erect poles on all streets, alleys, plazas, etc., and under this authority began work, continuing until the temporary injunction was secured. As a foundation for this writ, the Western Union alleges that the electric light wires will seriously interfere with its business by reason of induction, the electric current on the latter wires being so much stronger, and is liable to cause the death of their operators when wires become accidentally crossed, and might also cause fires.

Tyndall on Lightning Rods.

Professor Tyndall, in a letter on lightning conductors, points out that the abolition of resistance is absolutely necessary in connecting a lightning conductor with the earth, and this is done by closely embedding in the earth a plate of good conducting material and of large area. The largeness of area makes atonement for the imperfect conductivity of earth. The plate, in fact, constitutes a wide door through which the electricity passes freely into the earth, its disrupting and damaging effects being thereby avoided. A common way of dealing with lightning conductors, adopted by ignorant practitioners, is, Dr. Tyndall remarks, to carry the wire rope which forms part of the conductor down the wall and into the earth below, where it ends without any terminal plate. Such a "protection" is a mockery, a delusion, and a snare. Some years ago, a rock lighthouse on the Irish coast was struck by lightning, when he found by the engineer's report that the lightning conductor had been carried down the lighthouse tower, its lower extremity being carefully embedded in a stone perforated to receive it. If the object had been to invite the lightning to strike the tower, a better arrangement could hardly, he believes, have been adopted. He vetoed the proposal to employ a chain as a prolongation of the conductor, as the contact of link with link is never perfect.



* * The last issue for 1887 of the *American Machinist* is a particularly interesting and valuable number.

* * Thomaston, Conn., is to have an electric light plant for city lighting. Aaron Thomas, B. W. Pease and others are associated in the enterprise. $20,000 is the capital.

* * The Bentley-Knight Electric Railway is said to have made a very successful test of its new road in Allegheny, Pa. One-half mile of this track is operated by the conduit system, and the remainder by the over-head system. The conduit is a fine piece of engineering, and during a recent rainy spell the insulation was found to be all right.

* * The new method of welding by electricity is likely to reduce the risks of fire on theater stages by superseding the picturesque village forge, with its roaring bellows, flying sparks, and dangerous flames, all of which have to do duty at times in romantic plays. A beautiful stage effect was produced the other evening in New York in Wagner's opera "Siegfried," where Siegfried was able to wield his broken sword "Nothung" anew, after having it welded by electricity.

* * There is lots of fun at Cornell just now over the recent exploits of a professor, who captured a thief by means of an ingenious electrical device. Valuable tools had been taken from the electrical department, and the other day the professor hung a vest in the room, allowed a $10 bill to protrude from the pocket, and connected a small wire with the vest and a bell in another part of the building. As the wire was connected with an electrical apparatus, any movement of the vest would ring the bell. The next day or so the professor was called to the spot by the tinkle of the bell, and the thief, being caught in the act, made a clean breast of the matter, and sent home for money to pay for the stolen things.

* * An interesting trial of electrical hauling plant has just taken place at Newcastle Exhibition, with a view to demonstrate the applicability of this method of traction to underground workings. The motor was supplied by Messrs. Immisch & Co., of Prince of Wales' road, London, N., and was geared by worm and worm-wheel to a sheave 5 ft. in diameter. It drew seven loaded tubs, weighing 5 tons 6 cwt. 1 qr. up a road having a variable gradient averaging 1 in 75. The tractive force varied between 312 lb. and 704 lb. The power exerted by the rope varied from 4.85 horse power to 7.7 horse power on the up-grade, while the power absorbed by the motor was about 11 horse power, the unsatisfactory arrangement of the gearing accounting for a great part of the loss, its efficiency being only about 40 per cent.

* * A. G. Waterhouse, the electrician of the Waterhouse Electric and Manufacturing Company, of Hartford, Conn., is not only an electrician, but a mechanic as well. When in the mechanical field he won the gold medal offered by the State of California to inventors. Electrical and mechanical skill are the elements of success in electric lighting. The Waterhouse system came rapidly to the front from the beginning, and we are informed that it has been awarded a gold medal and diploma at the Mechanics' Fair, Boston, just closed. The award was made on account of remarkable tests in automatic regulation of arc dynamos, and "also the peculiar use of magnets both requiring the exercise of a high degree of inventive skill and applied science of great value, etc." We take pleasure in giving Mr. Waterhouse credit for having produced results in electric lighting which will take high rank.

SANTA CLAUS ELECTRIQUE.

CHRISTMAS REQUESTS PRESENTED BY ELECTRICAL PEOPLE.

GEO. L. PHILLIPS: "Say, Old Santa, just pass another telephone company this way."

E. R. WEEKS: "Don't believe I'll refuse it this time. It beats the vice-presidency."

E. T. GILLILAND: "The 'Goddess of Electricity' will I give the Electric Club. The phonograph will keep me busy."

M. W. GOODYEAR: "Fill my stockings with fresh soluble brains. Mine are tired out."

C. O. BAKER, JR.: "No more House Committee work for me, Sir Claus. I've figured myself blind over the cost of pickles and green peas. If you've a platinum mine, just throw it down the chimney."

JOHN B. POWELL: "Another trip to England, by Jove!"

GEO. L. BEETLE: "Chicago is a magnificent city. (Say, just hand me down a visit to New York.")

THOS. A. EDISON: "There it is—that package labeled 'Electricity Direct from Coal!' That's what I intend to have."

GEO. W. HEBARD: "My new electric light factory, rising like a Phœnix from its ashes, fully satisfies me."

H. B. THAYER: "My only fear is if I become rich suddenly I'll lead a fast life. Howsoever, I'll take that million for the gas burner."

JOHN A. SEELEY: "The same here."

C. D. HASKINS: "And here."

HENRY C. DAVIS: "As I haven't had very much to do this year, just pass me another Electric Club."

EUGENE F. PHILLIPS: "A new clam-bake design."

H. C. ADAMS: "Oh, I'm all right. Used to have to hunt up the boys; now they hunt me up."

EDWARDS H. GOFF: "The *Graphic* is sufficient. I would take another Goddess of Liberty, however."

HENRY D. STANLEY: "Throw me down a few hard-drawn copper orders that don't have to be filled until next November."

HUGH R GARDEN: "The cosiest legal department in New York, in our Twenty-third street office."

JOHN R. MULVANE: "The presidency of the National Telephone Association, do you say? Well, now, I'll think over that."

WILLARD L. CANDEE: "Thanks. A trip to Paris was just what I wanted."

H. L. STORKE: "Having been an editor, my modesty prevents my speaking up, but if there are any New York telephone companies running around loose, just mark them 'C. O. D. to Pooh-Bah.'"

GEO H. BENJAMIN: "How would it do, Uncle Santa, to hand me down a vindication?"

CHAS. DUTTON: "A new lecture, please."

JOHN W. BEANE: "Bunker and I had something to do with starting the Electric Club. Just read the minutes. Two medals, sil vous plait."

ED. A. LESLIE: "I'll take a telegraph company with staying powers."

F. W. JONES: "Just as willing to be cross-examined by W. U. attorneys again as not—in fact, I rather like it."

F. W. JONES (of South America): "Since getting a new wife, and a new—well, Old Santa, I don't want anything."

H. W. BYLLESBY: "No toys for me, I've got an electric meter."

HENRY HINE: "Just put a name for my new book into my left stocking, and oblige."

W. S. HINE: "Another Philadelphia brewery—for electric lighting purposes."

LEONARD E. CURTIS: "Some more Westinghouse correspondence."

GEORGE WESTINGHOUSE: "Bring on the Electric Light Convention."

STEPHEN D. FIELD: "I've got the motor, Eickemeyer the dynamo, but you might throw a few more wide-awake railway companies in through the window."

CLARK B HOTCHKISS: "A few more cable orders to round out a big year."

S. INSULL: "Kind of lonesome up here at Schenectady. Just present me with two visits to New York each week."

JOHN I. SABIN: "Send me a vacation."

C. J. H. WOODBURY: "I want three phonographs quick, or I'll be snowed under with work."

J. N. KELLER: "By way of change, I would like a ride between New York and Boston."

FRED. A. GILBERT: "No! I don't want a sheet of music, I tell you. I'm not John L. Sullivan's partner."

H. M. LINNELL: "The unspeakable Turk."

F. W. TOPPAN: "A bag of black sand for Goodyear."

ROBT. MACKIE: "A wig."

R. W. BLACKWELL: "A lightning express to Denver."

THOMAS P. CONANT: "Another presidential train with a storage battery conductor."

GEO. B. COGGESHALL: "Less 1 A.M.-ism at the Electric Club."

A. S. HIBBARD: "A telephone cabinet set in the office of the man in the moon."

FRANK RIDLON: "Oh that this too solid flesh would melt!"

H. W. SPANG: "Here too."

LOUIS DUNCAN: "A glimpse about twelve months ahead on the storage of electricity would make me happy."

GEO. F. PORTER: "More carbon combinations to conquer."

NORMAN MCCARTY: "Conquests are still so numerous that I ask for nothing more."

J. H. REID: "An engagement ring? Thanks, Santa."

A. V. GARRATT: "To ask for aught would not become me, so great a gift have I recently received."

W. W. SMITH: "The 'Reform' medal."

F. B. KNIGHT: "A French grammar. Wee, wee. I can parley fransay. What did Sheridan say about Texas?"

M. M. M. SLATTERY: "A new definition of electricity."

GARDINER C. SIMS: "Just hold on a little while. I can wait."

A. F. UPTON: "Cheap fuel."

H. L. SHIPPY: "An extra hour—so I can visit the Electric Club."

FRANK C. MASON: "Everybody with the rheumatism."

CHAS. A. CHEEVER: "An induction telegraph is just what *you* need, Col. Claus, for use in your aerial trips."

J. C. TOMLINSON: "Avaunt, avaunt, old man! Time for converse have I none. Stay! Prithee, the gift of song will come not amiss. I would out-sing the gallant sea-dog Toppy."

FRED. ROYCE: "Another game of hearts with Stanley and Goodyear."

THOS B. DOOLITTLE: "This is different. The 'ground floor' just once would be great medicine."

OTTO A. MOSES: "Paris is good enough for me."

H. D. LYMAN: "No, I am not a lineman. Your gift of spurs and pliers are herewith returned."

FRANK BEACH: "What I particularly like is a handsome traveling bag—with a patent lock."

GEORGE F. DURANT: "Some more Law switchboards, and please don't call them 'Lawless.'"

FRANK HARRINGTON: "A lower berth."

C. H. WILSON: "As compared with Columbus, I'll be pleased with Chicago."

J. F. MORRISON: "Anything except the presidency of the Electric Light Association."

WELLS W. LEGGETT: "Some additional tower lighting."

S. A. DUNCAN: "What I want to know is who will be in Pittsburgh next February?"

THOMSON-HOUSTON BAILEY: "A few more corner lots in Kansas City."

A. C. SMITH: "A competitive watch test."

C. A. BROWN: "Some one to help me fill these electric light orders."

JOHN A. BARRETT: "Please don't send me any more primary batteries. Life is too short to examine them all."

STEPHEN HOLBROOKE: "A glass of diluted water."

C. D. CRANDALL: "A home in a town where the mud is not all above the pavement."

E. L. SMITH: "Twenty per cent."

COL. D. B. PARKER: "Send me some more Rochesters."

THEO. N. VAIL: "As I have the earth (for my super-heated steam pipes) what more could I ask for?"

CHAS. K. WEAD: "An invulnerable wire gauge."

H. N. FENNER: "More braiding."

T. J. MCTIGHE: "You would confer a favor, my grey-bearded friend, if you would tell everybody how to pronounce my name. It's all I ask."

S. S. WHEELER: "Just hand me a few electrical problems; I enjoy them."

R. T. MCDONALD: "More worlds to conquer."

C. A. COFFIN: "Give me Aladdin's lamp, so I can instantly build another electric light factory."

W. F. SWIFT: "The good old journalistic days were halcyon days indeed, but I guess I'll stay in the electric lighting business a few years more. Just send me a few more Southern contracts."

F. A. CHENEY: "I would like some antifat."

E. I. GARFIELD: "Two and one-quarter minutes more time for lunch."

H. G. CHENEY: "Ask Pulsifer."

N. T. PULSIFER: "The paper manufacturing business possesses some interesting features, but for real surprises I know of nothing that equals electric lighting. With a new factory, orders rushing, and a loyal staff, guess you can pass us by, Santa."

H. A. GLASIER: "A night-key."

FRED. SWIFT: "On the whole, I'd rather catch whales. So give me a ride to San Francisco."

R. K. DANA: "As we are not extending our obligations, guess we can't accept your gift. Uncle Kris."

W. E. SHARPS: "Another rag for the commutator."

W. B. BUCHANAN: "A good hand."

T. W. PARMELE: "I would like 'satisfaction.'"

W. STANLEY, JR.: "More Chinese hair for lamp filaments."

JOHN S. HUYLER: "Here, Santa, just take this box of candy to the Electric Club for a New Year offering."

S. J. FOX: "A fog horn—to compete with Gilbert sleeping."

A. GRAHAM BELL: "A favorable Supreme Court decision would just fill my left stocking."

GEO. W. DAVENPORT: "Give me the Spanish-American provinces for electric lighting."

COL. FRED. MASON: "Having first introduced hard-drawn copper wire, my honors are complete."

T. L. FOWLER: "Cure for a cold."

O. E. MADDEN: "The perfect environments."

J. M. BROWN: "Electrical expressage between Washington and New York."

HARRY HASKINS: "Is it not my turn to visit the Old World?"

JAMES ENGLISH: "The treasurership of a half-dozen more electric lighting companies, just to keep my hand in."

The Clarke, Chapman & Parsons Steam Turbine for Dynamos.

We are indebted to our esteemed London contemporary, the *Electrician*, for cut and description of this interesting motor and the special dynamo used with it.

The steam pipe is attached at the flange immediately to the left of the pressure gauge. Below the pressure gauge is the throttle valve, controlled by the magnetic regulator. In the figure the barrel is shown of uniform diameter throughout its length, but in larger sizes the diameter is increased twice in passing from the center to either end, practically converting the engine into a triple-expansion engine. The steam enters the barrel at the center, passes through the succession of turbines to either end, whence it passes through a steam-way cast in the lower part of the barrel, and finally exhausts at the center just below the admission port. The spindle is of steel, and carries a number of brass disks, reduced near the periphery, where the blades are cut to half the thickness they possess at the center. The projecting ring thus formed has helical teeth cut upon it, constituting the moving blades, the pitch of the teeth varying along the length of the barrel, to allow of the expansion of the steam. The disks are made of such diameter as just to turn freely with the spindle within the barrel, without risk of contact with the interior of the rings which carry the fixed blades. The spindle is made very stiff, so as to allow the clearance to be made exceedingly small, as it is found that the loss of power due to the friction of the spindle and its bearings is exceedingly small, and it is very desirable to prevent, as far as possible, the passage of steam between the barrel and the disks. Between each of these disks there is an annular wheel, with helical teeth, corresponding to those on the disk, but sloping in the other direction. These form the fixed or guide blades. The annular wheels are fitted closely within the barrel, the teeth projecting from one-half of their width only, and it is within the smooth cylindrical portions of these annular wheels that the moving blades or teeth of the disks actually turn. There are a great number of pairs of disks, sometimes 45 or more, on each side of the center. The bearings are of great length.

In the triple-expansion engines steam-ways are cast in the upper part of the barrel, making connections between the right and left portions of the barrel at both the points of enlargement. This equilibrates the steam pressure at these points, and prevents more than one-sixth of the barrel being thrown out of work if any obstruction should occur to the passage of the steam.

In the front, at the center of the figure, is shown the oil vessel, the pipes connected with which are supplied with copper gills or radiators for the purpose of cooling the oil. A small screw on the spindle of the machine, at the extreme left of the figure, maintains the circulation of the oil, which flows continuously through all the bearings and through the interior of the armature. The rapid passage of the oil through the armature materially assists in keeping the temperature low, notwithstanding the very great electrical output of the machine in relation to its weight.

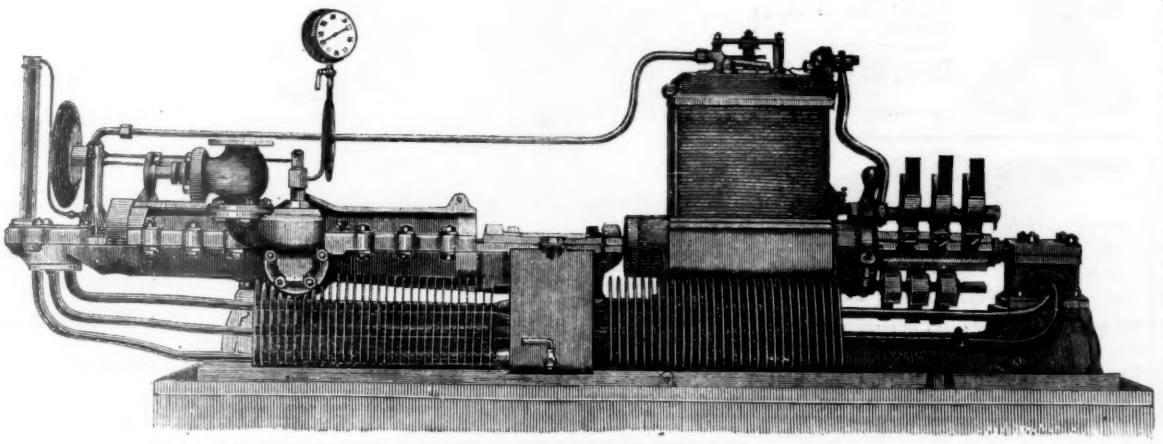
One of the most ingenious features of the generator is the magnetic governor. The field-magnet is shunt wound, but not nearly saturated. Hence any increase in the E. M.F. of the dynamo increases the magnetism of the field-magnet. Above the yoke is pivoted a bent iron bar, which is attached to a spring similar to the hair spring of a watch, so that this bar is mounted exactly like the balance-wheel of a watch. Projecting from this iron bar at an angle of about 45° is a gun-metal fork, the extremities of which are formed with sharp edges and move immediately in front of the opening of the small copper tube which is seen in the upper part of the figure. This tube communicates with a circular bellows, shown above the left end of the barrel. The bellows are kept distended by a spring, but a small turbine on the spindle of the motor tends to exhaust the air and make the bellows collapse under the atmospheric pressure. The throttle valve which regulates the steam supply is connected with the movable back of the bellows, the rod passing through a gland in the fixed front. When the iron bar above the field-magnet is inclined about 45° to the axis of the machine, the end of the copper tube is fully open, and air enters the bellows as fast as it is exhausted by the turbine, and the throttle valve remains fully open. If the E.M.F. increases, the iron bar turns in the direction of the lines of force against the constraint of the "hair spring," the end of the fork closes the air pipe, the bellows collapse under the exhaust of the little turbine, and the steam is shut off by the throttle valve. The action of this governor is so prompt, the moment of inertia of the moving parts of the machine being so small, that nearly all the load may be turned off the machine with scarcely a perceptible change in the brightness of the lamps remaining.

A common test of the governing arrangements of an electric light engine consists in suddenly breaking the connection of the armature, so as to take off the whole of the load, and observing whether, under these circumstances, the engine runs away. If the connection between the armature and the field-magnet is broken, the latter of course loses its magnetism, and the magnetic governor swings back under the action of the spring only. The result of this is to bring the other prong of the fork in front of the opening of the air tube, and by checking the influx of air to the bellows to cut off the steam supply.

It will be seen from the figure that the commutator is made of very great length. The brushes are of wire and press nearly "end on" to the commutator. The six brushes can be shifted into any position so as to keep the wear of the commutator even. The armature is of the cylinder type. The core is built up of thin charcoal iron plates, separated from each other by thin disks of paper. The disks are clamped up tight by two brass disks threaded on the shaft. The coils, which are laid in channels cut in the iron, are 30 or 40 in number, of stranded or solid copper wire, and each makes one complete turn. The whole is bound round with steel piano wire. The commutator segments are connected each to the ends of two adjacent coils, connected up in parallel. There are therefore 15 or 20 commutator bars.

The speed varies, according to the size of the machine, from 9,000 to about 10,000 revolutions per minute. The loss of power in the armature and field-magnet coils on the large machines amounts to only about one and a-half per cent., the high speed allowing exceedingly small resistance to be employed in the armature. A machine with an output of 32 electrical horse power in the outer circuit is about ten feet six inches in length, and one foot six inches in breadth. A small machine running a lamp of 1,000 candle power, besides a number of smaller lamps, was exhibited in the Newcastle Exhibition, suspended by three wires. The exhaust pipe was of india rubber, and the steam pipe was provided with a flexible joint, so that the machine could be shaken about while running. The locomotive "Emigrant," built by Messrs. R. & W. Hawthorn, Leslie & Co., for the Midland Railway of Western Australia, was furnished with an incandescent search light, and was exhibited at the Newcastle Exhibition with a small turbo-electric generator in the cab.

By an error of the engraver the commutator is shown as being square in section. This is wrong, and our readers must imagine it to be circular, as usual.



THE CLARKE, CHAPMAN & PARSONS STEAM TURBINE FOR DYNAMOS.

—— There are over 1,500 incandescent electric lights in use in the village of Bellows Falls, Vt.

—— The Middlesex Electric Light Company, of Lowell, Mass,, are building an addition to their station, and will increase their plant materally.

—— A special meeting of the stockholders of the Arnoux Electric Light and Power Company, of Maine, was held last week in Portland, Me. W. R. Wood reported that he had sold the stock of the company held by him in trust for 25 per cent. of its par value, or for $25 a share, and that the holders of certificates of said stock could receive $25 per share, in cash, or $100 worth of stock in the Maine Consolidated Electric Light Company at par. It was voted to authorize the secretary, Franklin J. Rollins, to proceed by bill in equity and otherwise to dissolve and terminate the Arnoux Electric Light and Power Company.

—— The Euphrat Electric Railway Cable Company of the United States (San Francisco) has been incorporated to alter, adapt and convert railroads, now operated by steam or other motive power, to electric railways; also to apply and adjust electric cable conductors or other devices for moving cars by electricity. Another object of the company is to acquire, develop and dispose of the Euphrat system for supplying from an insulated cable a direct and constant current of electricity to a traveling motor. The capital stock is $1,000,000, with $875,000 subscribed, and Edward Solomon, Frederick Euphrat, C. Mason Kinne, William H. Dimond and William R. Smedberg as directors.

ELECTRIC LIGHT NEWS

—— The Edison Illuminating Company, West Chester, Pa., voted $35 for funeral expenses to the families of each of the employes who were killed by the recent boiler explosion.

—— The contracts are let for an electric street railroad to be built and operated in the city of Little Rock, Ark. M. W. Benjamin is the chief mover in the company, and president of the same.

—— It is expected that the Edison laboratory at Orange, N. J., will be entirely completed before the expiration of another week. The dynamos are now being placed in the building, and will be in operation in a few days.

—— A local correspondent writes that the St. Johnsbury, Vt., electric light scheme seems to drag somewhat. Meanwhile, there is a prospect that if the home company does not occupy the field an outside company will soon be on the ground.

—— The Brush plant at Little Rock, Ark., has a capacity of 75 lights of 2,000 candle power. The work has recently been completed, under the superintendency of W. B. P. Mattox. J. A. Jones is president, and D. A. Adams secretary.

—— The Jarvis Engineering Company, Boston, Lave received a contract to erect a chimney for the Edison Illuminating Company, Lawrence, Mass. It will be built on the old style, and cost about one-third less than the usual style of chimney.

—— The Bessemer, Ala., Electric Light and Power Company are putting up a temporary structure under which to house their plant until the completion of a handsome, permanent brick structure. Mr. M. D. Montgomery represents the company.

—— The Quebec (Canada) Electric Light Company has 300 arc lights in use, 215 by the city, and the others private lights. These figures do not include the lights furnished to mills in the summer time. A new 50-light machine is being put in. Mr. A. Thomson is president of the company, and Mr. S. Mohr, general manager.

—— The Newburyport Electric Light Company, Newburyport, Mass., have decided to put in a direct-acting engine. They have ordered an Armington & Sims engine of 100 horse power of the Jarvis Engineering Company, and will also set a 125 horse power tubular boiler with the Jarvis furnace.

—— "I want to demonstrate," said Electrician Barrett, of Chicago, "the practicability of lighting the whole city by electricity and ultimately to do away with gas altogether. The city can light the streets and get better and yet cheaper light in this way. Our plant cost but $30,000, and is, I believe, the forerunner of a big system of lighting the streets, as well as the bridges and viaducts."

—— The Electric Gas Lighting Company, of Boston, is deservedly pleased. Advices from London inform them that their company has received, through its European agents (Woodhouse & Rawson) the highest award (Diploma of Honor), over all competitors, for its exhibit of electric gas lighting apparatus, annunciators, burglar alarms, etc. We congratulate Col. Burnham on this proper recognition.

—— The trenches for the electric light wire conduits in the Hoosac tunnel have been dug a distance of 4,000 feet from the west portal, and the conduits have been laid and wire strung for about 2,000 feet. Saturday work was commenced on the conduits from the east end. The dynamo plant will be established near the west portal, about five rods west of the signal house, and steam pipes will be run into the tunnel to protect the brick work from frost. This will be an improvement over the fire-box heretofore used for that purpose. The work is progressing fairly well.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING DEC. 20, 1887.

374,948 Clip or hanger clasp for supporting cables, etc.; Thomas T. Eckert, New York, N. Y.

374,959 Dynamo electric machine; Joshua Gray, Medford, Mass.

375,001 Electro-pneumatic mechanical movement; Alfred Roosevelt, New York, N. Y., executor of Hilborne L. Roosevelt, deceased.

375,007 Galvanic battery; James Serson, Boston, Mass.

375,014 Cut-out for electrical distribution apparatus; Marmaduke M. M. Slattery, Woburn, Mass., assignor of one-half to the Fort Wayne Electric Light Company, Fort Wayne, Ind.

375,002 Method of electric welding; Elihu Thomson, Lynn, Mass.

375,034 Carbon electrode for galvanic batteries; Charles H. Wilder, Natick, Mass., assignor to the Hub Carbon Company, Kennebunk, Maine.

375,063 Railway signal; J. Harper Gibson, New York, assignor to Charles E. Hubbell, Syracuse, N. Y.

375,083 Signal box; Morris Martin, Malden, Mass., assignor to the Municipal Signal Company, Portsmouth, N. H.

375,117 Combined gas and electric light fixture; Sigmund Bergmann, New York, N. Y.

375,118 Electric gas lighting apparatus; Charles B. Bosworth, Everett, Mass., assignor to the Electric Gas Lighting Company, of Maine.

375,160 Railway train timer; George W. Housel, Bloomsbury, N. J.

375,238 Electrical circuit closer; Marshall M. Welch, Atlanta, Ga.

375,242 375,243 Thermo-electric generator; Edward G. Acheson, Pittsburgh, Pa.

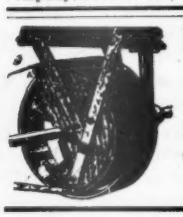
375,255 Combined electric motor and fan; Harry H. Blades, Detroit, Mich

375,276 Insulator; Edward C. Emery, San Diego Cal.

375,280 Tip for telephone cords; Frederick A. Forbes, Detroit, Mich.

375,295 Insulated electrical conductor; Albert Kissell, Salem, assignor to the Adamanta Manufacturing Company, Boston, Mass.

375,299 Municipal telegraph; Morris Martin, Malden, Mass., assignor to the Municipal Signal Company, Portsmouth, N. H.



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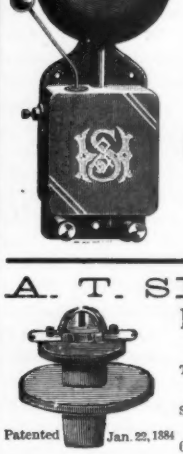

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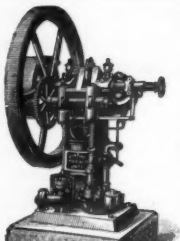

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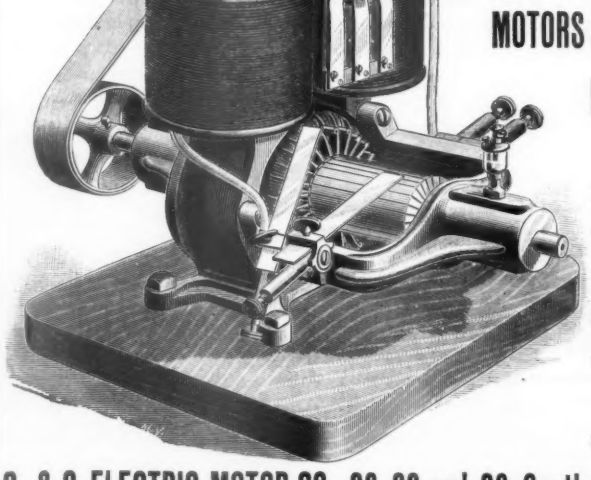

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